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ABSTRACT

This document considers the image of schools as "a world apart" and the subsequent question, "What if we teach these young people the wrong thing?" The author discusses many of the questions and problems that exist in this separate world of schools: problems of administration, the innovative process itself, the open education controversy, what students study, and the isolation of education from the everyday world. Nine target areas for educational improvement are listed, with some suggested programs for each area: a) "Identifying Where We Are Now and What We Can Build on: 'The National Inventory of Quality Resources'"; b) "Clarification of Basic Conceptualization Problems"; c) "Building a Stronger Base Theory"; d) "Building on and Strengthening the Craft"; e) "Integrity of the Content and of the Total Experience"; f) "Remedying the 'Isolation from Consumers'"; g) "Coping with the 'Diversity Gap'"--diversity of goals and schools and diversity among types of people; h) "Questions of Organizational Structure"; and i) "The Process of Innovation." (JA)

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Program Proposal for Improving The
Quality of Educational Experiences.
Robert Davis. December 15, 1971.

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PROGRAM PROPOSALS FOR IMPROVING

THE QUALITY OF EDUCATIONAL EXPERIENCES

A. A WORLD APART

With the rise in modern technological societies has come a new life-style for young people. Once they learned farming on their father's farm; cooking in their mother's kitchen; and glass-blowing, or law, or engineering by apprenticeship. Today, things have changed. Young people now spend their youth in special places, apart from the world and the work of their parents--apart even from older brothers and sisters. For children under 18, these special places are called schools, and for older youth they are called business schools, universities, law schools, and so on.

By creating these separate places, society took on an awe-inspiring responsibility: to separate the child from the world of reality, and in this isolated place to provide every good thing that the real world itself might have provided. This is to be done, however, not automatically, but as a result of careful theory and meticulous practice. Instead of reality, we propose to put a child "in school" and give him something "better", something artificially designed as an improvement on reality, something more appropriate for the special needs of young people. This is an undertaking of no mean proportions. Over the decades, as this system has grown into something vast and expensive, one sees more and more clearly that our practice is for the most part far from satisfactory, and that our theory does not provide the foundation necessary to design and operate an artificial world that will in fact represent an improvement on the natural world outside schools.

PROBLEMS IN PRACTICE

TEACHING THE WRONG THING

Isolation from the world at large necessarily poses a good many serious problems. At a practical level, there is always the danger that what is done in school won't match up with what is done in the world outside--prospective beauticians, for example, may learn the use of obsolete equipment in school they will never see in any operating beauty parlor. Students may study computer programming in obsolete languages. The chemistry taught in school may be an old-fashioned version, now discredited in a field where sizeable changes occur very rapidly. Business

practice taught in school may be nineteenth-century in spirit and methods.

Besides the obsolescence of equipment, points of view, or actual content within existing courses, there is an equally important but more elusive kind of obsolescence which becomes possible in the separate isolated environment: namely, the failure to take advantage of new reorganizations of knowledge. The trivium and quadrivium, which give us the basis for our present divisions of knowledge, are 2,000 years old. Today's world outside of schools no longer recognizes as fundamental the distinctions embodied in our traditional arrangement of knowledge into established "disciplines". Some examples of the new organizations of knowledge that are already reaching into schools and colleges include: ecology, around which considerable biology, botany, chemistry, economics, history, and sociology can be organized; powerful decision procedure, data processing, and problem solving languages, around which one can organize much of what is now studied as arithmetic, algebra, geometry, statistics, physics, linguistics, and psychology; construction of apparatus (such as the Hampshire College Freshman course on building Lasers) as an activity around which one can organize the study of physics and engineering; anthropological study of one's own culture, around which one can organize much of what is now studied as sociology, literature, history, political science, art, and anthropology. The importance of these reorganization possibilities must not be underestimated; without such reorganization, we shall be tied mainly to antiquated points of view and antiquated emphases. It is clearly impossible for young people to start at the same beginnings and follow the same paths, when each generation faces nearly twice as much that needs to be learned. Better highways through all of this knowledge must be found, and it is already clear that better highways can be found. In the past, the main intellectual breakthroughs have been direct results of such reorganizations of existing knowledge; as one example, Descartes' reorganization of algebra and geometry into a single unified subject made possible the work of Newton, Euler, Weierstrass, Lagrange, Gauss, Riemann, and Einstein, and hence the great flowering of mathematics on which most current technology--including modern space exploration--depends.

To the extent that schools and colleges become separate worlds, not directly involved with the larger worlds of finding new knowledge and using all knowledge effectively, they may feel no need to deal with these reorganizations. Inaction in this area, however, will necessarily be very harmful both to the

individual careers of those who pass through the schools, and to the future intellectual power of our society itself. (Consider the cost to Nazi Germany of their decision to ignore the reorganization of thought represented by "Jewish physics.")

There is a third sense in which schools, being isolated from deeper experience and expertise, are always in danger of teaching the wrong thing. Does a child really learn by studying the "subject" (e.g., "reading"), or does he actually learn by studying the teacher, or the culture? To some extent he learns from all three, but there is reason to believe that "the subject" is the thing from which he learns least. When a teacher stays up late to solve a problem for discussion the next day, the student may benefit from the actual solution that has been worked out, but he will usually benefit more from the teacher's personal example in staying up late to work out the solution. If the teacher valued the activity enough to lose sleep over it, that speaks to the student more powerfully than words can. Thus, a child could not be expected to learn as much from an actor reading lines--however eloquently--about chemistry experiments as he could from day-in, day-out contact with someone who valued chemistry so much that he devoted much of his life to studying it.

Young people today are showing a potentially dangerous lack of commitment to the traditional values of scholarship, understanding, mastery, and performance in areas of business, science, medicine, technology, etc. One cannot help but notice that these same young people are now in--or are recent graduates of--an educational system that has thought it unimportant for learners to be in the presence of adults who personally embody the values in question. We have thought the art teacher to be an acceptable substitute for the artist, the history teacher to be an acceptable substitute for the historian, the biology teacher to be an acceptable substitute for the biologist. To the extent that a student studies--and learns from--the subject, these substitutions may be acceptable. But to the extent that the student learns from the teacher by emulating an attractive adult model, these substitutions are not at all acceptable, for they represent different value systems, different forms of commitment.

Effective learning as a result of the emulation of appropriate adult models depends both upon the adults' depth of commitment and the acceptability of the adult model to the child. This "acceptability" involves over-all cultural nearness of compatibility. To the extent that learning is emulation, we

should expect a black child to learn reading more effectively from a teacher who is culturally close to him, and who has a deep commitment to reading, than from a teacher who is culturally alienated from the child, or whose own commitment to reading is minimal. Some recent studies(1) indicate that the United States faces major problems in this area. Our schools are commonly shaped according to a theory that the child learns the subject (and neither the teacher nor the culture); our research commonly follows the lines of this theory; and our practice has been based on teachers whose value commitments to reading, chemistry, history, etc., are often weak.(1) There is abundant evidence of cultural gaps between teachers and students, and many of the proposed new directions for American education (such as programmed materials and computer-based instruction) would take us even further down the road of denying young people the close contact with adult emulation models that seems to be essential for effective learning. Future research (such as the NIE might undertake) has, therefore, the potential to lead our nation further down the road toward separating learners from adult emulation models, or conversely, leading us back to a recognition of the importance of effective adult emulation models, and to a determination to provide them. Which road we take will have decisive implications for the future of our society.

NOT ANCHORED TO EXTERNAL REALITY, A SELF-CONTAINED SOCIETY CAN DRIFT WHERE IT SHOULDN'T GO

Being a self-contained miniature society--and one in which students' voices are not often heeded--schools can evolve in directions that are not consistent with the laws and customs of the external world. Thus, in most schools, no one bothers much about limitations on the rights of search and seizure when a youngster is on the receiving end. Nor do students have any form of freedom of speech. In fact, students basically have no rights that are defended by law and custom as the rights of adults supposedly are. Learning this fact is part of what students learn in school. A well-known documentary film shows a school scene in which an adult advises a youngster to "take his medicine like a man," despite the young man's contention that he is innocent of the offense in question. Schools do not require evidence for a conviction. The society of school is a society apart, and has grown apart from our generally-accepted values to the point where the mismatch between school values and

and the values of society as a whole is becoming a very serious problem, both for schools and for the future of our society.

There is evidence(2) that isolation from adult society drives youth to the creation of its own culture. Young people who have few adult models to influence their thinking or behavior turn to their peers for the creation of their social norms and values. They adopt a system of dress, speech, perhaps drug use, which emphasizes the separation these young people feel. Adults (especially adult authority such as parents, teachers, and police) then attack these adoptions not as manifestations of a problem, but as problems in their own right. In turn, the misunderstandings that result increase the gap between the world of the child and the world of the adult.

LOVE, CARE, AND UNDERSTANDING FROM AN INSTITUTION

At the most practical level, young people are removed from the ordinary world of homes, cars, television, shops, fields, and streams, and are closed up in an institution which must then provide whatever personal attention, care and understanding that it can. This institution must also solve the usual institutional needs of moving people around, keeping track of them, providing for their physical needs, and so on. From careful professional observers(3,4) we know that even the better schools have problems with children waiting in line to sharpen their pencils, waiting in line to get a drink of water, waiting for their turn to get a moment of the teacher's attention. There are even more serious problems(4) in providing the student with an opportunity to study something at (approximately) the time when he is ready to study it, without being either too soon or too late.

Yet we know that, serious as these problems are in the United States, they have been largly overcome by the more successful "open" or "integrated day" classrooms in Great Britain. The waiting-in-line has been largely eliminated by a different approach to scheduling, and the question of giving a child what he is presently ready for has been solved by a distinctive British approach to individualization(5,6,7) which has been little explored in the United States. Among all the reports of this break-through in Britain, Lillian Weber's The English Infant School and Informal Education[8] stands out for its emphasis that these British solutions have been developed, and are being implemented, within tax-supported schools that--in the USA--would be called "public." These "institutions" have shown a capacity to respond

in ways commonly thought to be quite beyond their abilities.

PROBLEMS IN THEORY

The word "theory," in education, suggests something wholly irrelevant. It may therefore be worthwhile to bear in mind the example of economics. Few would claim that economic theory is important. Errors in theory can nullify any practical effort to control inflation, to reduce unemployment, or to achieve a favorable balance of payments. When a President proclaims his allegiance to those particular theories called "Keynesian," that is a matter for excited comment in the world press. The importance of theory in economics seems to be firmly accepted.

Why, then, is educational theory considered irrelevant? One theory (no longer current, but once quite popular) held that when a child misspelled words, it was because his body was temporarily inhabited by the devil. The cure, then, was to drive the devil out of the child's body, which was done by making the child's body an uncomfortable place to be-- and this, in turn, was accomplished by beating the child. (A remnant of this theory survives today in the phrase "to beat the devil out of" someone.) In education, as in economics, theories are guides to action, and incorrect theories greatly increase the likelihood of unsuitable actions.

Educational practice today stands on a foundation of a trivial and inadequate theory, one that identifies such measurement artifacts as "achievement levels" in mathematics, while ignoring the actual processes of human data-processing; that studies individual differences on gross variables such as "speed of learning," while ignoring subtle and far more important differences in determination and initiative (for which common folk-wisdom has provided a vocabulary centuries ago); that studies response to various systems of rewards while ignoring one's individual "state of mind;" that attempts to describe all learning experiences in terms of "observable changes in learner behavior;" that extrapolates from experiments lasting two weeks to design programs for 12 years of a student's life; and that extrapolates from the behavior of rats and pigeons to design programs for human beings.

PROBLEMS IN VALUES

Not all parents want the same thing for their children, nor do all students share a single common goal. These differences

become apparent when one looks in detail at the task of improving a single school. (Indeed, as Katz argues(9)it is possible that the process of improving schools is grinding to a halt precisely because of disagreements over how schools should be different, disagreements over the direction that change should take.)

There is also much that is unsettled about proper spheres of influence; in what areas are the values of the home primary; in what areas are the values of schools primary; in what areas are the values of the local communities primary; in what areas are national values primary? These questions become more pressing as questions of drug abuse, sex education, early childhood experiences, and similar topics loom larger. Moreover, values are often interrelated with skills, techniques, and knowledge: many (perhaps most) parents do not know how to help children grow to optimally effective adulthood, and local community values are often based on a distorted vision of the larger society.

PROBLEMS IN ADMINISTRATION

Given a rapidly growing school system, nearly always confronted with financial problems, unsure of its own image, in conflict over goals, not based on any reliable theory, and deeply attached to day-to-day practices that are widely agreed to be unsatisfactory, what developments in education have occurred? A primary one--since a sound basis in theory has been unavailable, and since agreement on goals has been impossible to achieve--has been two-pronged: a very large increase in the number of administrators and middle-management people, (New Haven, Connecticut, is reported to have one administrator for every 9 classroom teachers(7,10)and an increasing reliance on attempts to apply "remote control" to dictate, from a distance, what shall take place in classrooms.

However, lacking any language to discuss, record, or plan what goes on in classrooms at anything much above a superficial level, this expansion of administration and increased reliance on "remote control"(5,7,10,11)has led to confusion and rigidity, rather than to flexibility and successful problem-solving. It has also greatly diminished the autonomy and professionalism of classroom teachers, and it has frustrated students and parents who can't find the appropriate place to ask for change.

PROBLEMS IN THE INNOVATIVE PROCESS ITSELF

Although there is surprisingly wide agreement on the need for

better educational opportunities for all students, actual attempts at improvement have had little impact. Their common fate has been either to be ignored, or else to be adapted into a form that destroys any chance for major improvement. One must therefore also study why the improvement process has itself so often failed.

B. A CLOSER LOOK--THINGS TO WATCH FOR

THE "OPEN EDUCATION" CONTROVERSY

Two quite different approaches to education are presently in competition with one another*, and much of the future of American education hangs on the outcome of this competitive struggle.

In terms of physical arrangements, View I sees students typically seated at desks, working with books and other paper-and-pencil-and-printed-materials. View II sees students working, either alone or in small groups, on a diversity of tasks, many of which involve apparatus or physical objects of all sorts, both animated and inanimate. In terms of types of learner activity, View I sees students listening, reading, or writing; View II sees students in addition, observing, measuring, building, drawing, discussing, teaching, or assisting someone else.

In terms of the allocation of space, View I assigns each student to his own desk and chair; View II commonly assigns space in terms of tasks: "This is a reading area;" "this is the science area;" "this is the cooking area;" etc. View I has, typically, a roomful of very similar students (for example, in K-12 schools all the children in the room will usually be at the same grade level, and nearly the same age), all working on very similar (or identical) tasks. View II fills the room with a greater diversity of students and activities (in K-12 schools, some students will be older than others, and some students will be teaching others).

Time allocation is also different. View I has everyone starting and stopping similar tasks at the same time. That time is usually pre-arranged before the student appears on the scene

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*Charles Silberman's three-year study of education in the United States[5] contains a well documented description of the two alternatives, highlighting various comparisons and differences.

by teachers or administrators. View II has each small group of students starting work when they are free from other demands, and continuing as long as they can do so productively. As much as possible, these times are determined by the students themselves.

The notion of a "task" can be seen in relation to time. For View I, a "task" is a very small thing--the answering of a single question, the filling in of a blank in a workbook, the reading of a single paragraph--that typically takes a few seconds, or at most (and rarely) a few minutes as in the case of more advanced mathematics problems. For View II, a "task" is usually a project, and may occupy minutes, hours, or days. Typical tasks include writing a short play, incubating duck eggs in order to study the gradual development of the foetus, making a 16mm. movie, reading a story, working out a set of axioms to prove some theorems that the student conjectures, designing and building a piece of playground equipment, or programming a computer to control some physical apparatus (perhaps a marionette show).

Does the small group of people in this room have some sense of contributing a "culture," of being their own "mini-society"? View I answers no; View II answers yes. In achieving this sense of culture it is important that a member of this class gets to initiate activities, make suggestions and see them carried out, vote on other people's suggestions, design equipment and help to build it, and share discussions (on all sorts of topics) with other group members. In many cases he will also be a member of this group for three consecutive years, thanks to the multi-age grouping arrangement.

What is the role of the teacher? View I casts him as a lecturer to students; and the person who says what is to be done, and how it is to be done. View II sees the teacher as the provider of an enriched physical environment (which the students may, however, help to continually re-shape), a coordinator of people and activities, an organizer of a very few major intellectual themes around which the students build their curricula, the main source of adult values within the microculture of this classroom, a resource person for a wide range of possible needs, and an intimate confidant for individual students.

What kind of learning is expected of students? View I expects primarily: the rote memorization of facts and procedures; plus drill on procedures, used out of context, that provides some familiarity with the procedure itself, but no insight into why the procedure is carried out the way that it is, nor how it would occur (perhaps in modified forms) in actual everyday practice; and, finally, the acquisition of certain specific skills. View II expects that students will learn primarily a range of "coping" or "problem-solving" skills, a deeper insight into oneself personally, and patterns of humane behavior in interpersonal situations. Only secondarily does View II seek knowledge of facts and highly specific skills. View II puts great emphasis on process--carrying out a scientific investigation, writing a play, driving an automobile, conversing in French, playing the piano--and much less emphasis on what Whitehead has called "inert ideas"--that is, abstract verbal statements unrelated to anything you actually do. By "coping" and "problem solving" skills, View II means the kinds of things ordinarily described by words such as resourcefulness, good judgment, persistence, thoroughness, ingenuity, originality, effectiveness, articulateness, creativity, and so on.

View I has been described by J. J. Schwab (12) as dealing with knowledge in terms of "a rhetoric of fact," whereas View II deals with knowledge in terms of a "rhetoric of inquiry."

View I would say that a student was "doing science" when he was memorizing a vocabulary list of words such as "cell," "atom," "genetics," "energy," etc. View II would say that a student was "doing science" when he was finding a way to keep some spiders alive through a two generations cycle, or trying to find out why some paper absorbs water better than other paper does. View I would say that studying music might involve memorizing the themes from a dozen famous symphonies so that you could identify Bethoven's Fifth, or Schubert's "Unfinished" Symphony. View II would classify at least part of music as an "expressive activity," carried out for its own sake, and not instrumental to achieving something else, so that listening to the Beatles or to Johnny Cash would very likely be included, along with performing simplified music or using simplified instruments in the style of the Carl Orff music program. View I would say that mathematics involves memorizing the fact that:

$$1/2 \div 3/5 = 1/2 \times 5/3$$

whereas View II would say that mathematics related to:

$$1/2 \div 3/5$$

primarily when one uses the process(13)of seeking similar--but simpler--problems in order to get guidance from possible analogies (e.g., $8 \div 2$ might refer to eight things shared equally between two people); when one inquires into the meaning of $1/2 \div 3/5$ (does it mean "one half of a thing divided equally among three-fifths of a person?"); when one solves specific simple examples (e.g., $1/2 \div 1/4$) in order to have a foundation from which

to generalize; when one is finally able to use all of this to state an appropriate generalization; and when one can make up an appropriate abstract system described axiomatically so that one can prove the result as a theorem.

In terms of the psychological theories that relate closest to each kind of value system and practice, probably B. F. Skinner's work lies close to View I, while View II is nearer to the conceptualizations of Piaget, Freud, and Bruner.

View II is nowdays often referred to as "open education" or "Plowden-related" education; there is no commonly-used name for View I, probably because it is so nearly ubiquitous that it is just "education." Nonetheless, a View II approach can be seen in practice, extensively in Great Britain, and by careful selection of schools and teachers, also in the United States. Within the U.S., an interest in open education is growing rapidly, as attested to by a spate of recent books, more and more trips to England to observe schools there, and front-page articles in The New York Times and The Wall Street Journal.

Comparisons between View I education and View II education are hard to make at present, and this fact throws interesting light both on educational practice and on educational theory. In terms of practice, there is great difficulty in putting any significant innovation into operation at an acceptable level of quality--our present educational system is unable to cope effectively with diversity. In terms of theory, there is the problem of comparing two quite different views of education, which make different assumptions and value different outcomes. Following Thomas Kuhn, (14) we call this the "paradigm" problem. Comparisons become difficult because different kinds of data would be relevant, and all data would tend to be interpreted differently. There is a second kind of theoretical problem that is more specific to education, namely a premature de-emphasis of naturalistic observation and a premature emphasis on higher levels of abstraction in making comparisons. (15)

HOW IS SUCH DISAGREEMENT POSSIBLE?

Given the fundamental role that education plays in our society, it may seem surprising that there can be a fundamental disagreement about what it "really" is, and how it should take place. Again, a parallel with economics is highly suggestive, for there, too, one sees disagreements over fundamental conceptualizations and between competing theories, and there too the disagreements have great significance for quite practical everyday activities. Fundamentally, disagreement flourishes in education for two basic reasons: the "conceptualization" or "paradigm" problem, and the absence of enough diversity to allow one to study significantly different situations.

Conceptualization and Emphasis. A school is a complicated intermingling of different people playing different roles; a great variety of interpersonal social interactions; many different kinds of activities; and many different expectations, prejudices, priorities, assumptions, and goals. When one tries to study schools systematically--or even think about them--one is faced with the question: how shall we conceptualize all of this activity?

> This is not a problem that is limited to the study of education; it occurs whenever we try to think seriously about anything. Thomas Kuhn (14) shows the role of the conceptualization problem in physics and chemistry: e.g., Lavoisier and Priestly each heated an orange powder and obtained a gas. They could not agree on what they had done, because they could not agree on a basis conceptualization. Had they added "caloric" to the powder? Yes, if one thought that heat was "caloric," no otherwise. What was the gas they had obtained? We, today, think in terms of compounds and elements, a conceptualization unknown to Lavoisier and Priestley. Hence we could say that they had heated the compound mercuric oxide and obtained the element oxygen--they could not, because they did not think in these terms, even though they delt with the same actual powder and gas as we do today.

At the simplest level, how shall we think about learning? Some investigators define learning as "an observable change in behavior." But others find this definition unacceptable on the double grounds that, first, any change in observed behavior may fail to match even obvious notions of what is learned (e.g.: Under Church pressure, Galileo retracted his theory of the solar system in a public statement. Did this observed change in Galileo's external behavior correspond to "what Galileo had learned"?), and second, experiments by Jean Piaget (16) indicate that a child may be better able to draw a picture of any array of sticks six months after he views the array than he was immediately after viewing it--in some way the child has "digested" the information more thoroughly in the intervening six months; thus, the observed change in his behavior immediately after seeing the array does not in any way reflect the true "seed" that was planted by observing the array and which bore fruit six months later. To define learning as the result of seeing the array in terms of observable behavior at an arbitrary time "shortly" thereafter would be to define this seed out of existence.

At the present time, Piagetian psychologists will usually define "learning" in terms of further development of the cognitive structure inside the learner's head. This is a distinctive definition, quite different from the definition in terms of "mental muscle" that faculty psychologists of the past would give, and also quite different from the definition that might be given in terms of Gagne's hierachies of gross skills,etc.

There is not, at present, a general agreement on what it means for someone to "learn" something.

To take a second example, there is not agreement as to how to conceptualize goals and objectives. One carefully-reported episode in a third-grade class deals with a child who made up an original algorithm for subtracting. (17) Educators and mathematicians do not agree on the goal for the lesson in question: was it to learn an algorithm for subtraction, or was it to provide children with an opportunity to develop their own methods of thinking about the problem of subtraction algorithms? The statement of the goal has practical consequences, in that if the goal was merely subtraction algorithms, the child's creative originality then appears irrelevant--and is indeed so regarded by some educators. Opponents argue that the child's originality is of central importance, and that to deny this is to reduce arithmetic to a trivial subject, of little interest to most children.

How shall we think about the learning of arithmetic? The one route sees it as a creative venture with somewhat incidental practical outcomes; the other sees it as a rote learning of certain specific procedures. The different views imply different teaching strategies, different testing procedures, and different interpretations of the results.

Limitations of Self-Consistent Systems. A method for conceptualizing schools and learning may be self-consistent without being satisfactory. For example, a conceptualization that attributed everything to magic might be internally self-consistent, and those who believed in it might be able to explain everything to their own satisfaction, yet other people would reject these explanations. At a realistic level, a conceptualization that deals entirely with responses to certain stereotyped questions is not uncommon, and is not internally inconsistent, but it, too, is not satisfactory: it accepts the rote memorization of theorem proofs in geometry as a goal, and measures this kind of "learning" in it's testing program. It ignores the question of making heuristic analyses of theorems in order to interpret clues and so create "original" proofs (a la Polya), or of making heuristic analyses of existing proofs in order to lay bare the reasoning that led to their creation. The "responses to stereotyped questions" approach pays no attention to such heuristics: it does not teach them, does not test for them, and is thereby self-consistent, but inadequate. The result--a very common one in education--is to trivialize the subjects being learned, and to replace essential process (such as the anlysis or creation of proofs in geometry) by simple rote facts and memorized procedures.

WHAT DO STUDENTS STUDY?

We have referred earlier (cf. pages 3-4)to the relative importance of three different things that studies are studying: the subject, the teacher, and the culture.

Consider, as an example, an hypothetical instance involving vocational education. Imagine a community that (perhaps unconsciously) places a low value on manual-skills occupations: on automobile mechanics, drill-press operators, gardeners, printers, loom fixers, etc. The culture external to the school is then negative to such occupations, and will tend to discourage students from electing vocational programs. But suppose that some students find that they are talented in manual crafts, and enjoy them--thus the subject itself positively encourages and attracts the students. Perhaps students encounter an individual teacher of, for example, metal working, who inspires them. Finally, however, there is a culture within the school; if school practice is to assign disruptive students and those with poor achievement records to the vocational program, the school culture is creating a negative image for this program. One sees the possibility--even the likelihood--that community culture, school culture, the teacher, and the subject can all pull students in different directions.

But the distinction between subject, teacher, and culture goes considerably deeper than this, and becomes central to the question of what a student is actually studying. "Studying the subject" is reasonably obvious. "Studying the teacher" means assessing the teacher's value system, his social role, etc., deciding upon his suitability or unsuitability as a model for emulation, and then either trying to become more like the teacher or else trying to avoid being like the teacher. "Studying the culture" means trying to understand and acquire the world view, the skills, etc., that are commonly possessed by others, or respected by them.

This distinction reveals itself clearly at times--in English usage for example. Many children say "ain't" instead of "isn't." The formal instructional program of the school attempts to teach the child to say "isn't." Nobody "teaches" the child to say "ain't," but he picks up this usage nonetheless because he learns it from the culture.

The distinction is important for the reasons cited earlier: both current theory and current practice tend to assume that students study the subject. Consequently, both theory and practice accept art teachers who are not artists, mathematics teachers who do not value mathematics, etc. Both theory and practice go even further, in accepting programmed instruction materials and computer-based instruction programs that deny to young people any contact with adult emulation models for the values in question (such as everyone who cares enough about music to spend much of his life practicing the clarinet, etc.). If there should be, on the scene, an adult who has internalized a deep commitment to music, the hierarchial structure and value system within the school will probably not value highly this commitment and the resulting forms of achievement. In this way also, the school culture will demonstrate that this kind of commitment "is not really important," is not highly valued.

Many observers have commented on the "invisible" reading program often found in British "open" schools;(7)one never sees a "lesson" in reading, yet the children do learn to read and write, and a great deal of reading and writing occurs in these schools. The school culture clearly and unambiguously values reading and writing, and children seem to learn it from the culture perhaps more than any other way. (What the children learn from the school and community culture obviously varies with the culture. What does not vary is the great effectiveness of the culture as a teacher, which we witness time and again, in diverse forms, ranging from the gratifying results of the "invisible" British reading program, to the tragic results of learning shoplifting and drug usage from various teen-age cultures in the United States.)

The "revelance" crisis, which exists in one form or another at all levels of education, is partly a consequence of not giving students adult emulation models, and of not giving students opportunities for direct participation in a culture that truly embodies the values, skills, and outlooks in question. Thus those schools that do more adequately meet these two demands have been least effected by problems of "relevance": that is to say, engineering schools, law schools, art schools, etc., have had relatively little controversy over relevance because they do provide personal models for emulation and participation in a visible culture that truly embodies the values in question.

Thus, among all forms of separation, one of the most important is that which separates schools or colleges from the genuine "content" areas that students seek to join: chemistry, architecture, automotive repair work, small business management, etc. It should be obvious that this problem of separation from the bona fide practitioners (or, to put it the other way around, the importance of student membership in genuine cultures that extend beyond the school) has fundamental implications for teacher education, for the selection of who shall teach and where students shall study, for the proper role for programmed materials and for computer-based instruction, for research programs, for assessment and evaluation, for open education, and for school-community relations.

ISOLATION

Much of the preceding discussion has dealt explicitly with the notion that "education" and "training" should occur in special places, separated from the everyday world; and conducted by special people, who withdraw from the everyday world to devote all of their working time to the instruction of the young. It has been argued that the result is to immerse young people in a culture that deals in a superficial way with largely trivial matters; a culture which, above all, lacks anthenticity.

Where this concern for isolation has not been explicit, it has been implicit, that it underlies nearly every aspect of educational quality.

The point, however, is so fundamental that it deserves still further consideration, by way of looking at several types of isolation, considering some of the consequences of isolation, and examining a few implications of a commitment to reduce this isolation.

At the pre-college level, for example, teachers are commonly isolated from experience, from expertise, and from experts. Consider a pre-college teacher of German. If he or she has never been to Germany, has no first-hand experience with German culture, has never extensively studied German literature and history, has never been employed as a simultaneous translator or as a translator of technical documents, and so on, then this teacher has been cut off from authentic experiences with German. He cannot give his students what he does not possess--enthusiasm based on authentic experience, the living example of a deep personal commitment to the study of German.

Recognition of this problem is not new. In earlier decades of this century, German teachers were commonly given salary advancement for summers spent studying in Germany. Teachers, themselves recognizing the problem, have often made valiant attempts to obtain depth and authenticity of experience. Unfortunately, the task has not been easy. Consider the case of high school mathematics teachers. Many have sought summer study at universities, only to find that mathematics departments were focusing all of their energies on training professional mathematicians, and had little interest in, or no courses for, teachers. Some teachers found that their own undergraduate education, often obtained at teachers' colleges, had not prepared them for university mathematics courses. There was no way, then, for them to study within mathematics departments. But to enroll instead in schools of education was to increase, not decrease the problem of isolation.

Some significant alleviation of the problem was achieved by national programs designed so that mathematics departments could create new courses specifically for high school mathematics teachers, but these programs have not yet gone as far as necessary. Indeed, these programs themselves are already in some danger of becoming cast-offs from the mathematics departments, and thus themselves becoming isolated from authentic mathematics.

We are now faced with the need to provide still better ways for high school mathematics teachers to gain deeper and more authentic experience with mathematics. In 1972 there is, fortunately, the prospect of making further substantial progress: unemployment among mathematicians generally, a sharply reduced demand for research mathematicians, and economic crises in universities are causing university mathematics departments to consider their priorities and programs with a determination not previously seen. (Similar situations already exist, or soon will, in many other subject areas.) Thus a new national program to provide authentic university study opportunities for high school teachers--

perhaps related directly to new high school opportunities for young people--has an opportunity today to achieve deeper penetration than ever before. Perhaps teachers can have direct experience with the content they seek to offer their children, perhaps teachers can have direct personal contact with experts, and acquire greater expertise for themselves.

At the same time, an even more direct approach deserves serious consideration. Since in many areas persons of unquestioned expertise are under-employed or marginally-employed, consideration needs to be given to ways of involving them directly in the education of young people. Employing such experts as paraprofessionals, although it is receiving some present attention, is clearly an unacceptable answer, since it violates the principle of creating a culture within the school that values such expertise highly, and demonstrates this value by its actions.

Another form of isolation is the isolation of students from experience, from expertise, and from experts. The nature of this isolation is all too clear, expecially in light of the points discussed above.

Yet another form of isolation is that of master teachers from educational research and from teacher education. We live, David Hawkins has suggested, in an age when the practice of the most highly skilled practitioners is far in advance of the theory of the best theorists. There are some exceptionally effective teachers. As a recent report from a group of sociologists remarks: "People may say that education is heavier than air, but there are men and women out there who know how to make it fly. We must find out who they are and how they do it."(18) Yet at present we do not know in many cases who these exceptionally effective teachers are, and we are far from knowing how they do it.

This being the case, one would assume that theoretical efforts would assign a high priority to identifying these teachers, and to trying to discover the secrets of their success. At present this doesn't occur --but it might be relatively easy to achieve as a result of planned programs.

This situation that Hawkins describes is not unprecedented in human history. There have often been cases where the practice of the best practitioners was far ahead of the theory of the best theorists: brewing beer, making wine, making perfumes, making glass, Stradivarius making violins, curing leather, navigating at sea, and using plants for their therapeutic value are all well-known examples of effective practice far in advance of the best available theory. Astronomers using divergent infinite series in their calculations--and, to the consternation of mathematicians, using them successfully--is a less-well-known, but quite typical, example. And of course there is the familiar example of professional baseball pitchers throwing curves while physicists were proving theoretically that it was impossible to pitch a curve.

The gap between theory and practice has implications also for teacher education. Far more effective ways must be found to allow young teachers to learn from the best practice of outstandingly effective teachers. Given the present capabilities of recording human behavior in highly authentic form by means of the unobtrusive use of motion-picture film and videotape, this problem should not be too difficult to solve.

Which Way Are we Headed? While the availability of technology such as motion-picture films and videotapes give us better means of recording authentic human experience in ways that are not limited by the state of development of our theories, while the present state of the economy makes it possible to imagine recruiting persons of authentic expertise for work in education--while, in short, there are many present opportunities for ending the isolation of students and teachers--what is not at all certain is whether we shall seize these opportunities or allow them to slip by.

We know of no accurate assessments of the degree to which students and teachers are isolated, and hence cannot say whether the situation is improving or worsening. From gross indications it seems that students themselves are taking active steps to end the isolation and to move toward greater participation and relevance. Various sectors of the educative community--in the most inclusive sense of this term--are showing a potential responsiveness.(19) Nonetheless, there are strong pressures against such developments. A review of the fates of Regional Education Laboratories might well indicate that those which have had the greatest concern for relevance and for overcoming isolation have also had more-than-average difficulty in securing continuing funding, very possibly because criteria for demonstrating effectiveness in this effort are not well recognized. By contrast, a self-consistent system, devoted mainly to drilling students on simple verbal statements, and testing subsequent student ability to recognize or produce such statements, constitutes an effective way of producing definitive results. Thus, a commonly-accepted (though deficient) notion about the goal of schools leads to a self-consistent world view that nowhere challenges its own inadequacy, especially in relation to the question of isolation.

Economic pressures on schools may also constitute a force toward greater isolation, in that the development of an authentic and viable culture is often regarded as more expensive than the development of self-instructional (or "teacher-proof") materials. Some of the obvious methods of producing an authentic culture may cost money--e.g., continuing teacher study of his or her discipline, continuing teacher experience with current experimental techniques, etc. It may not be inevitable that such efforts cost extra money: making it easier, or even mandatory, for teachers to move back and forth between industrial or other practical or scholarly employment and full-time teaching, might not necessarily increase costs. Judged against teacher effectiveness, and against the

long-term costs to our society of compelling our young people to grow up in "a world apart," the creation of authentic cultures for young people may even turn out to be an irresistable bargain.

The creation of self-instructional materials for students deserves careful consideration, both for its possible desirable impact and for its possible undesirable impact. (By "self-instructional materials" we mean anything from books that students can read themselves, to programmed learning materials, workbooks, tape cassettes for independent study, or computer-based instruction, which have the purpose of rendering the student largely independent of the knowledge, guidance, and help of any human teacher.) If self-instructional materials are constructed to immerse the student in an authentic culture, that is one thing; if they are constructed to produce memorization of rote procedures or facts, that is something else again. If they are used in classrooms to enable schools to employ paraprofessionals in place of teachers, the probable consequence will be a further downgrading of scholarship, relevance, and authenticity--this course puts young people in direct personal contact, not with scholars, experts, or other experienced people, but rather with professional baby-sitters. Rather than providing more suitable adult emulation models, and participation in an authentic and relevant culture, this course would increase the young person's isolation from the rest of society. By contrast, if self-instructional materials are used to make it easier for students to move out of classrooms, and into experiences throughout the community, the result would be to overcome some of the present isolation. In both the construction and the use of self-instructional materials, how they are constructed or used is likely to determine whether their use leads to more or less isolation for teachers and young people. (It is not impossible to have teachers and young people studying side-by-side through the use of self-instructional materials.)

Even today's rapid advance in technology and knowledge constitutes a pressure to drive schools away from creating authentic cultures for their students. The more rapidly knowledge grows, the more likely it is that any given individual will find himself falling further and further behind the current practice and current knowledge. This state applies to all people, including teachers and administrators, and makes it more difficult for schools to avoid obsolescence, irrelevance, and isolation from current practice.

Notice that the destruction of a teacher's "authentic" role is two-pronged: it involves his or her isolation from authentic experience with subject matter competence (a problem especially for high schools and colleges); and it involves destruction of the art of classroom teaching in part through conceptualizations of education that have sought

to by-pass the "practitioner's expertise" and reach for something more abstract.

KNOWLEDGE COMES IN DIFFERENT FORMS

Part of the complexity of the task of improving education is that knowledge itself comes in many forms. For the kinds of reasons discussed above, schools have come to deal mainly in abstract symbolic statements of the sort that are ordinarily printed on the pages of books: F = ma, George Washington was born in 1732,

$$\int_0^\infty e^{-x^2}\,dx = \tfrac{1}{2}\sqrt{\pi},$$

or

$$Na^+ + Cl^- = NaCl$$

and so on. There is no doubt that personal possession of a large store of such knowledge is valuable, even essential. Yet it is by no means sufficient, nor is it usually decisive. What counts far more is a large array of skills, habits, and abilities, such as: the ability to believe in oneself, and building on this ability, to persevere even in the face of adversity; the ability to recognize patterns and to make use of them, the ability--or even habit--that leads one to be tactful with others, thoughtful of others, and able to see the point of view of others.

It is in these latter areas that critics protest the ineffectiveness of education. Present education is in fact able to teach facts and routine skills reasonably well. Where schools commonly fail is in helping young people to acquire self-understanding, creativity, originality, flexibility, purposeful commitments, the ability to cope in a wide range of situations, humane standards of human behavior, reasonable aspiration levels,and an adequate set of personal values, and skill in all the more complex processes of life.

In their conception of knowledge, schools show no fundamental change from the days when Dickens wrote, in Hard Times, about Thomas Gradgrind, the school-master who dealt in "Facts, Sir; nothing but Facts!," and who saw his students as "little vessels then and there arranged in order, ready to have imperial gallons of facts poured into them until they were full to the brim."

In its practice, the school is limited by its vision of knowledge. Precisely because this is a limitation of vision, in its evaluation and self-analysis educational theory fails to take note of this limitation, and judges itself mainly by its success in teaching facts and routine skills. (4-6, 12, 26-30, 76-80)

Yet, neither employability, nor happiness, nor good citizenship can be achieved solely on the basis of factual knowledge and routine skills.

THE DIVERSITY GAP

The general sameness of schools is well known. Around most of the world, schools assume very similar forms and employ very similar practices. Because this sameness is not based upon fundamental agreement about objectives--concerning which people, on the contrary, mainly disagree--nor upon optimal effectiveness, it stands in the way of our knowing much about the possible effectiveness of any alternatives. In order to gain more knowledge about the effect of education, we must first create a greater diversity of educational opportunities, so that comparisons can be made.

The reasons for creating diversity are both numerous and compelling.

Diversity of Goals. Parents and students do not agree on what schools should be like, what they should try to accomplish, and how they should go about it. Seeking different kinds of schools, but confronted by only a single standard model, parents and students are becoming increasingly aware of the gap between the diversity they seek and the uniformity that is available.

Diverse Schools for Different Kinds of People. One of the clearest facts about students is that different students have different needs, different strengths and weaknesses, different responses to any specific kind of experience or situation. Many schools make little provision to match these student differences with appropriately different educational opportunities.

In building diversity, we shall probably need to distinguish different paradigms. The teacher education, the reading materials, the furniture, the daily and weekly schedule that work best for one kind of education will probably not work well for another, basically different, kind of education. Thus we may need to replace the notion of "what is best" by the quite different notion of "what is best for this particular approach to education." This distinction applies also to evaluation: in each paradigm we must recognize different goals, different criteria for success. At the same time, no paradigm can be evaluated solely in terms of its own stated objectives--one needs to consider, also, any possible side effects which may be important.

In any case, one thing is clear: an NIE must assign high priority to the task of creating more variety and diversity among available educational options. The present sameness of educational opportunities binds us too closely to a situation that is far too unsatisfactory to far too many people. We have much less diversity than we need.

C. SOME PROPOSED PROGRAMS

What can be done to improve the quality of education at each of the various levels? Nine targets are described in this section, with programs outlined for each target.

1. Identifying Where We Are Now, and What We Can Build on: The National Inventory of Quality Resources

No bigger error could be made than to create a large Federal program for improving the quality of education, and to do it in such a way that various interested parties felt themselves to be excluded. Not only would such a course alienate those who feel excluded, and thereby convert potential friends into actual enemies, but it would also deprive the national effort of some of the most important resources available.

The problem of recruiting talent is not a new one; athletic coaches have been solving it for some time. To solve this problem in relation to educational R&D, we propose three programs: find outstanding individual teachers, principals, or innovators; identify unusual valuable organizations; and devise a system for describing, analyzing, and cataloging the work of these people and institutions to see more clearly what they are accomplishing. This three-part effort, taken together, would be known as The National Inventory of Quality Resources. Some starts in this direction have already been made: for example Lockhard(20), FWRL(21),and ERIC(22);but, for various reasons, none of these go nearly as far as is needed. Some attempts (e.g., Leonard Warren's work in California) make it clear that what is proposed here is, in fact, feasible.

The most novel aspects of what is proposed here would be:

i) The emphasis on QUALITY. This is not a mere "telephone book" compilation.

ii) The reliance on human judgment in making identifications, as is the case in all serious quests for quality, whether Nobel prizes, Academy Awards, etc. No automatic decision procedure can identify quality.

iii)Some rights of appeal or argument for those who feel they (or others) have been unjustly omitted.

iv) Contributions would be viewed sympathetically--since one is not buying a finished product, but is instead looking for promising ideas and practices, one can afford to be tolerant of imperfections or unfinished work. Thus the survey can seek out more important ideas for larger improvements, and is not limited to things that are "ready for mass production right now." Indeed, this latter category would

mainly not be included, since they can be disseminated through standard commercial procedures. (Specific examples could be cited to show that this is not a meaningless distinction.)

v) A major aspect of this effort would be the very serious program to describe, analyze, and catalogue the resulting ideas and procedures. (Again, it is possible to exhibit actual examples to show how important this is: e.g., one excellent teacher has a very novel method for organizing the curriculum that totally eliminates a separation into "different subjects," and into "a reading period," "a math period," etc. Her curriculum is organized by themes, such as "water," "growth and change," and "dyes.")

vi) Also noteworthy is the fact that the identification will depend upon observation and study of the practices or ideas themselves--usually through the use of carefully chosen "talent scouts." Judgments will not be based upon written "proposals"--for the same reason that athletic coaches use talent scouts: the best pass-receiver may not be the same person who can write the best essay on pass receiving, and one wants to select the man or woman who can actually do the job.

vii) Selection would not be limited by a single conceptualization or paradigm. We have become convinced that the paradigm controversy (discussed earlier) is deep and highly significant. The different views of teaching and learning that are emerging cannot be "averaged" or "homogenized" into a single view; their differences are essential and fundamental. Thus, one must not exclude those instances of excellence that belong to a different paradigm.

viii) On the contrary, assembling excellent exemplars of the various paradigms would constitute a major step in the clarification of what, precisely, these different paradigms are. (This is much like collecting specimens in biology or zoology, from which one can then create a meaningful taxonomy.)

ix) Finally, a major difference lies in what would be done after quality resources are identified. They will be used, in many different and effective ways. For example, where appropriate, classroom practice will be recorded on film or videotape, in order that others may see examplary teaching in practice. Where organizations are doing genuinely excellent work, efforts will be made to see that this work continues, and bears fruit, as fully as possible.

The National Inventory of Quality Resources

a. Identification of individual teachers, principals, and innovators(23), primarily by means of carefully selected "talent scouts."

Programs intended to find out what the best teachers do that makes them so effective, and programs to help other teachers learn how to do likewise, are described in Section 4, and below.

b. Identification of exemplary organizations. This is somewhat similar to "a", but depends more heavily on a careful analysis of the materials and services created or provided by these organizations. One eminent educator has remarked that major resources and curriculum organizations are like the yeti--one never sees the thing itself, only its footprints; and if the temperature rises high enough, even the record of its tracks disappears.

Consequently there is an important need here to analyze carefully what was done, why it was done, the historical development of the organization, the strengths and limitations of its products, policies, and actions, and other similar pertinent data. (The feasibility of such an effort is domonstrated by the work in precisely this direction that is now underway by an international conference on Curriculum Development Styles sponsored by The University of Illinois and the Center for Educational Research and Innovation of the Organization for Economic Cooperation and Development. At the present time many smaller efforts in this direction are also underway, for example by some State Departments of Education; but in the nature of things small local efforts are an inefficient, expensive, and ineffective way to catalogue national resources.)

c. Devising an Appropriate Method for Describing, Analyzing, and Cataloguing these ideas and practices.

This is one of the most important parts of the entire program, and the aspect that has the greatest significance for developing a deeper understanding of the processes of education.

Some arguments in favor of these three programs:

1) They let everyone know that his or her contribution is welcome and will be seriously considered.

2) They provide an inventory of where the United States actually stands right now.

3) If the analysis phase is carried out carefully, these programs can do much to dispel some of the myths and fads that typically afflict education.

4) These programs provide an essential beginning for the delineation and explication of the various conceptual paradigms--they move us toward an understanding of what good education really is.

2. Clarification of the Basic Conceptualization Problem.

As discussed above, we have become convinced that one problem that lies at the root of many (indeed, nearly all) other educational problems

is a fundamental disagreement over what education is and how it is best accomplished. This is not a superficial disagreement, but one that lies deeply embedded in fundamental concepts.

> This is a "paradigm" problem, in the sense of Kahn. We have cited earlier the controversy between Priestly and Lavoisier, over a chemistry experiment involving the heating of an orange powder and the collection of a gas. The Priestley-Lavoisier controversy is entirely typical of paradigm controversies through the history of science. What had each done when they "heated" the powder: had they added coloric to it? Yes, if one believed that heating meant the addition of caloric; no, otherwise. How did you settle this disagreement? Since it dealt with basic conceptualizations, there was no simple way to settle it. What was the resulting gas? Was it air? Did it contain more or iess phlogiston than air did? Or was phlogiston irrelevent? None of these questions proved easy to settle. (14)
>
> This kind of paradigm controversey is typical of science, though it has often been overlooked in the past.
>
> At the present moment, education is rifted by precisely this sort of basic paradigm controversy. In the earlier pages an attempt has been made to indicate the nature of this split. Put very briefly--indeed, oversimplified--one conceptualization sees knowledge as consisting largely of small pieces of information, mostly capable of representation in abstract symbolic form, that can be learned in this symbolic form, in small pieces, and reassembled by subsequent mental data processing to the extent that the learner's intelligence allows and external needs require. The other view regards knowledge as something that develops in stages, usually beginning with a pre-verbal "intuitive" stage that is somehow distilled out of rich multi-sensory experience, subsequently consolidated into internal cognitive structures which both facilitate and shape the assimilation of new information. The two different views lead inevitably to differing notions as to what learning experiences should be like, and also as to how you would recognize when learning has taken place.
>
> We have come to believe that this fundamental difference is a true paradigm controversy in the sense of Kuhn, and that, so long as this controversy remains unsolved (which, if history is any guide, may mean for as long as several decades), there will in effect be two different versions of education, different both in theory and in practice.
>
> The main implications is that a two-pronged attack is necessary: on the one hand, efforts must be made to

clarify both conceptualizations and resolve their differences: on the other hand, in the interim, great care must be taken not to preclude one or the other conceptualization, and one must work with the most secure kinds of knowledge that is available--which, among other things, means a heavy reliance on the wisdom of experienced practitioners (including consideration of "practitioner's maxims," in the sense of Polanyi).

All serious studies occasionally encounter the paradigm conflict problem. This problem need be no impediment to progress provided we recognize that the problem exists. Obviously, a failure to take the problem seriously can have unfortunate implications--as if we tried to build modern chemistry on a foundation of the phylogiston theory, or modern medical practice on the foundation of the theory that ill people recover when we bleed them to reduce humors.

Specific recommended programs:

a. Perhaps the most useful program will be the analysis of the different varieties of present exemplary practice, already listed as program 1-c, above. This should provide a foundation for identifying the various paradigms, and for the clarification of each.

b. Commissioning the preparation of some scholarly papers that attempt to make each present paradigm as clear as possible, and that focus attention on the key points of similarity and of difference between distinct paradigms. What are the different things that different people mean when they speak of "learning" and "education"?

c. Project some scenarios for the future of our society, helping everyone to see in graphic terms the implications that follow from an acceptance of each of the competing conceptualizations of education.

3. Building a Stronger Basic Theory

From teachers, social scientists, content specialists, and educators one hears, time and again, that commonly-used, present-day educational theory is over-simplified and simplistic, focusing on the most blatant one per cent of phenomena and neglecting the 99% that is subtle, profound, and complicated. Yet it is that 99% that makes all the real difference in people's lives. This simplistic theory in turn leads to simplism in rhetoric, in thought, in practice--even in vision of what is possible.

It involves methodological problems, such as encapsulating complex situations inadequately within a single member ("a fifth-grade reading level"), and studying complicated operations by input-output methodology (so that a school's expenditures on science materials are correlated

with student achievement on tests, ignoring such things as the fact that the teacher who ordered the materials is no longer there, and her successor does not know how to use the materials; while on the other end, the test used to measure student achievement deals with vocabulary in botany and biology, whereas the actual learning experiences explore the way batteries and bulbs work). It is argued that that which is amenable to certain techniques is studied and even heavily overemphasized, whereas that which is refractory is neglected, no matter how important it may be. (A common parable in educational circles is the tale of an intoxicated person who, very late at night, is searching the ground in the cone of light cast by a street lamp. A passerby elicits the information that the searcher has lost his keys. However, further discussion reveals that he lost his keys half a block away, nowhere near where he is looking. "But," the searcher argues, "it's too dark to see down there where I lost them, so I'm searching up here where there's more light.") All of this adds up to a kind of Gresham's law, whereby easy and trivial theories drive out any consideration of that which is subtle or complex. Included also is Hawkin's point (24) that the time and effort involved in setting up any situation worth studying is far greater than present arrangements allow. In some rather typical educational experiments, the value of an abacus might be tested by giving some teachers a few hours of instruction in its use, then comparing the effect when these teachers provide a few hours instruction to children--as against a control group where this does not occur. Contrast the superficiality of this with anthropological comparisons of cultures that do use the abacus in instruction, vs. those that don't: in the cultures that do, the teacher herself learned about arithmetic this way when she was a child, she has probably devoted many hours to playing with an abacus and thinking about it, she has been using it in her own teaching for years, and she has worked closely with hundreds of children who were using the abacus in previous years. Further, each child has parents who learned on the abacus, and perhaps also older brothers and sisters, and playmates, who did. These two kinds of studies are actually studying two different things: one studies possible short-term gains from a superficial use of the abacus; the other studies the long-term effects that may occur if use of the abacus becomes seriously embedded in our culture.

The consequences of this simplism are felt throughout education. At the level of consumer pressure on schools, one distinguished educator (25) has argued that parents so often voice dissatisfaction with schools in terms of reading scores and mathematics achievement-test scores either because this is the only aspect of schools they feel they can talk about--even though their actual dissatisfactions lie in other areas entirely, such as (perhaps) the failure of school office personnel to treat black people civilly--or else because they don't believe the school can make any difference to their children in such extremely important areas as aspiration levels, self-confidence, or ability to empathize with others. If there were more emphasis on other, subtler aspects of schools, this

would soon become reflected in parental interest in these other areas --or in the expression of presently unvoiced interest in these areas.

Teachers regularly report that they feel constrained to address themselves, not to what they believe to be children's real needs, but to certain aspects of reading or arithmetic which they know will be emphasized on standardized tests. This pressure to "teach for the test" thus denies the students the broader experiences that might help them to use these ideas, to understand the ideas more deeply, or to become more interested in the ideas.

In communications between teachers, principals, and central office personnel, these various subtler matters are ignored because there is no simple way to discuss them effectively.

Teachers also report that in many situations--disruptive behavior by some students is a common example--they do not have and cannot get any basic information that would let them know the basis for the behavior. Why is Randy disruptive? Is it physiological? Is it related to his home situation? Is it due to factors outside the school? Is it perhaps even genetic? Teachers ordinarily have no basic data available on such children, or even on such behavior.

All of this adds up to an urgent need for a deeper, more adequate theory of growth, behavior, learning, and knowledge.

Suggested programs:

a. Studies of subtler and more elusive variables.

Teachers and others suggest a long list of variables that they believe to be important, but which are usually too elusive and are therefore ignored by everyday theory--and, all too often, by everyday practice. Examples include:

When a parent visits the school, does he feel welcome? In what ways, precisely, is a welcome (or a lack of welcome) communicated to the parent? Does it depend upon how he is dressed, or upon his race or ethnic background? Does the parent feel that his personal goals for his children are reasonably consonant with the school's goals? (It is by no means only blacks who feel alienated from the school's goals--many professional parents report that the school's programs are "Mickey Mouse" imitations instead of genuine studies. (Cf., e.g., (26) Does the parent feel that he is condescended to? Does he conclude that his relationship with school personnel has the feeling or tone of an adversary relationship? Does the parent feel that he is being manipulated?

This kind of "Gresham's law" will become especially crucial if one or another form of performance contracting gains popularity, and also if private day-care centers gain in numbers (7).

b. Monitoring the Trade-Offs between Systematic Study of Subtle Variables vs. Direct Reliance on Judgment and Intuition.

Obviously the study of more subtle variables (3-a, above) could become very large, very expensive, very complex, and very unwieldy. In fact, it could prove unworkable. What alternatives exist? Merely withdrawing from the field and conceding victory to the measurement of a few blatant variables necessarily leads to the problems discussed above (teachers ignoring a child's needs in order to "teach for the coming test," etc.).

There is a possible alternative, however--reliance on human judgment to deal with the more elusive variables (7, p.171) as is done by the British program of HMI's (Her Majesty's Inspectors).

In the present case, if any extended program to pursue subtler variables is undertaken, it should be monitored carefully, and regular assessments should be made as to whether it might not be preferable to shift the emphasis toward a direct use of human judgment (i.e., instead of measuring subtle variables, a trustworthy person makes site visits, etc.). Programs of this latter kind, which deal with judgment and experience instead of explicit formalized theory, are listed below, under Section 4.

c. The Study of Physiological Variables

These would include the effect of blood sugar levels, uric acid levels, protein deficiency, individual variations in metabolism, etc.

The importance of this area speaks for itself. Teachers cannot be expected to use pedagogical virtuosity to overcome basic physiological problems.

d. Encourage Alternative Approaches, especially to the study of human data processing or decision-making procedures.

The work of Piaget's Geneva group has been outstanding in this area. Yet a Piagetian approach is still rare in the United States.

Studies in artificial intelligence may also contribute some of the alternative basic conceptualizations that could lead to a deeper understanding of human information processing and decision making.

e. Encourage more interdisciplinary teams working on higher cognitive processes.

In the learning of, say, physics, no professional group has the depth of experience to match physicists themselves. Interdisciplinary studies of a field, including experts in the field itself, plus experts in various approaches to human information processing, could help produce a non-trivial theory of how one learns to "think like a physicist" or to "think like a lawyer." Such programs are urgently needed, not because we are desperately short of physicists or lawyers, but

because without such programs we run the grave risk of developing a trivial theory of learning itself, and in future years finding our best practice humbled to the level of this trivial theory.

f. Cultural studies of the classroom and the surrounding community.

Observing the most effective educational settings usually reveals the classroom (or local environment) as a kind of small-sized local culture, with its own codes, priorities, etc. Various anthropologists and social psychologists have considerable skill in studying such cultures; this skill should be used in order to get more insight into why some educational settings work so differently from others. (Where identifiable content is a factor, content specialists should also be involved in such studies.)

g. Investigation of the "milieu hypothesis".

Many teachers, educators, and content specialists have expressed the belief that students acquire their "coping", "goal setting", "self-awareness", and "empathy" skills more from the general social milieu than from any explicit "instruction". This hypothesis needs to be stated very clearly, and studied very carefully in actual learning situations. (6, 7, 12, 26-49) Indeed, this comes close to being the "critical experiment" to settle the paradigm controversy discussed earlier (Cf. section 2.).

h. One program important in this area is discussed in Section 4, below, namely: the careful explication of "teacher belief systems." What is it that exceptionally good teachers believe they are doing? Careful study here may suggest new ways of conceptualizing learning, maturation and education.

i. Consideration of methodological problems.

A programatic attack might involve commissioning some papers on such methodological problems as the limitations of input-output studies, etc.

j. Explicit study of the "triviality" problem.

Observers have repeatedly noted the preoccupation of schools with trivial facts and skills, and schools' avoidance of things which are subtle, profound, or even difficult (Cf. especially (5)). This phenomenon deserves direct study. How could one explore the extent to which school experiences lack depth and significant challenge? Many different approaches are possible, including:

i) The comparison of school experiences with experiences outside of school (games children play; playground experiences; children's hobbies; children's reading habits; other undertakings by children, from ways of earning money to ways of influencing their peers; subjects, such as music and ballet, studied outside of school.).

ii) Comparison of regular school programs with special experimental programs.

iii) Creation of direct measures of "significance" or "complexity," vs. "triviality."

k. Early Childhood Studies

With so much evidence calling attention to the importance of early childhood experiences (50), it is important that relatively few adults are sure they know how to behave as parents. Even if they know the kind of adults they hope their children will become, few parents know which actions on their part will lead to these results. Much more needs to be known about the consequences on children of parental attitudes, parental personalities, and parental actions (51).

l. The Education of Parents

As more becomes known about the effect of parent behavior on children, one can look to the creation of special programs for the education of parents, in either high school, college, or special adult education centers.

m. Building a Stronger Historical Record

The swinging-pendulum phenomenon, the problem of fads, and other education problems are in part the result of a failure to build up the strongest possible historical record. This record should be detailed enough, candid enough, and subject to enough analysis to allow us to learn from past experience.

Related programs: Nearly every other program suggested in this document would relate to the building of a stronger historical record. For example, the record of what people have believed would involve program 4-d; examples of good practice, cumulatively with passing time, would depend upon program 4-c; achieving a cogent description of what has been going on would involve (among others) programs 1-c, 2-b and most of 3.

n. Extension of the Present Document--Creation of a Broad "Overview" Document

The present document is the work of a few people and a few consultants. It is necessarily very limited. But it does point up an important possibility: the careful development of a comprehensive rationale and overview document that would attempt to outline where we stand in relation to solving the problems of better education. Despite the contributions of various individuals, one must be struck by the extent to which our present awareness is a piecemeal thing. There is no over-all "game plan" for the improvement of the quality of education. Such a plan should be created, if only to serve as a target for those who wish to argue in favor of other lines of attack.

4. Building On and Strengthening the Craft

The preceding discussion illustrates the contrast between the subtle and elaborate uses of human judgment and intuition and the overly simplified

use of measurements with a few common variables. The dangers implicit in such a situation--that our practice will soon descend to the level of our theory--have been discussed. There are two main paths to avoid this degeneration: to build a subtler theory, or to take direct action to strengthen our practice. Section 3 dealt with sophisticating our theory; Section 4 deals with strengthening practice--taking seriously the art and craft of teaching, identifying the best practitioners, learning as much from them as possible, giving them the best possible opportunities for their own future improvement, and sharing the results with others as effectively as possible.

In fact, one of the great mysteries of education is why this approach has not been used far more in the past. Possibly its neglect is partly attributable to the strong egalitarian theme in American public education, which has often sought to de-emphasize individual excellence; possibly it is partly attributable to what McLuhan (52) has called the mass-production factory notion of schools, which has regarded teachers as interchangeable parts, with a minimum of special personal characteristics (see also Callahan).

This is not the pattern we have witnessed in music, in photography, in movie making, in sports, etc. In these areas, exceptionally skillful practitioners have successfully moved forward the frontiers of their art, and more typical practitioners have followed along in the paths of the leaders. (The same could be said of astronomy, microscopy, surgery, and many other fields.)

A program to strengthen and build on the art and craft of teaching has several rather obvious components:

- finding the most successful practitioners
- sorting them out according to the different practice paradigms
- recording their work as faithfully as possible
- analyzing and cataloguing their work
- allowing other practitioners to learn from them as effectively as possible
- explicating their own views of what they are doing
- determining why they are successful and how they came to develop their skill
- using the study of exceptional practitioners as a starting point for the construction of subtler and deeper theories.

The case against investing in the craft of teaching includes such arguments as the observation that most teachers probably can never rise to the level of the best, and that greater economic efficiency can be achieved by investing in materials, programs, and learning environments which attempt to reach students more directly. Both of the preceding arguments can be at least partly refuted. However, the strongest case for developing the craft of teaching is probably based on four main claims:

i) Building on the craft is more immediately available as a resource right now. Better theories may be built, but they will take time. In

the meantime, there are men and women who can provide excellent educational opportunities right now. Many of them could be located rather quickly. This expertise can be used more widely.

ii) The craft approach may turn out to be necessary in any case, if the approach via a more sophisticated theory should prove to be unwieldy (Cf. Program 3-b).

iii) In any event, identifying and studying the most successful practitioners surely provides one of the best possible starting points for the construction of better theories.

iv) Finally, building on the "craft" is one of the safest ways to proceed. Instead of betting heavily on the adequacy of any new theory, one is building on proven successes, on a very large body of experience, and on experience that has included a wide diversity of different situations. This should minimize the likelihood of any sudden unhappy surprises.

Specific programs:

a. Identifying superior teachers, principals, and innovators (Cf. 1-a).

b. Articulation of the different practice paradigms. Teachers who use an "open education" format are carrying on a different activity than the one carried on in more familiar formats. Even finer discriminations between different kinds of learning situations are becoming evident. These distinctions are of great importance, because one cannot make sense out of a situation that confuses dogs with horses, or cats with canaries.

c. Record, as faithfully as possible, some outstanding learning situations--using 16mm. sound motion-picture film, videotape, etc. Also use reportorial means of recording.

Such programs should begin by considering the possibility of extending some preliminary programs of this type that are already underway. (53)

d. The explication of "teacher belief systems."

Polanyi (54) , Smith (4), and others (42) note that teachers and other practitioners do have their own ideas as to what they are doing, what they are trying to do, which parts of their work are succeeding and which are failing, and why they do as they do. Practitioners are not always correct, and their language is not usually the abstract language of science, but their expressed beliefs are an excellent starting point for a subtler understanding of teaching and learning.

e. One program, suggested by various consultants, would attempt to make it easier for more teachers to record key observations, remarks, and interpretations, for analysis by some arrangement of central clearing houses. Expected outcomes are rather modest, but such a program might be one step toward reshaping the teacher's role, helping the teacher to become more fully a professional.

f. Creation of some school-based R&D centers.

If an East Hill School (Ithaca, N.Y.), a Nova School (Ft. Lauderdale,

Florida), or a World of Inquiry School (Rochester, N.Y.) can pioneer new educational arrangements, or if various schools can demonstrate (as a few can) markedly superior educational practice, can these schools become the nucleus for an educational R&D center that seeks to clarify their operating assumptions, test them where possible, and create materials appropriate to this new kind of educational setting? This follows an important principle: it is better to find excellent practice and to build upon it, wherever possible, rather than beginning de novo the creation of a new program or institution.

g. Creation of School Based Teacher Education Programs

This program follows the rational of program 4-f, immediately above. It also follows the actual example of the Shady Hill School, in Cambridge, Massachusetts, and of The Bank Street School in New York City. The basic idea is to let people learn the craft of teaching by working directly with carefully identified superior practitioners. Surprisingly, this is for the most part not possible at the present time, so that the proposed program would fill a major need.

It is essential that the number of such institutions be kept small, so that each is built on conspicuously superior practice, and not merely "good average practice."

Related programs: Above all else, programs 1-a, 4-b, 4-c, and 4-d.

h. Creation of experimental settings with greater opportunity to innovate, and greater impact.

The argument here is that, based upon observation of many present "experimental" programs, it seems clear that in virtually every case the limits are drawn so tightly that the "experimental" program is constrained to be very nearly identical with previous programs. There is no leeway to do anything differently. Therefore there is no way to create the diversity from which one might develop a theoretical understanding, and also (the point that is relevant here) there is not a broad enough scope to allow the best practitioners to demonstrate how much the craft is really capable of.

Creating a few situations with greater leeway would need to be done carefully, and special pains must be taken to involve those genuinely excellent practitioners who could take full advantage of this opportunity. But once new paths have been charted, it would be relatively easy for many more teachers to follow them.

i. Creation of alternative organizational arrangements within school systems.

This is a cross-listing of a program suggested by numerous consultants, that would be designed to identify either teachers or else principals as the dominant responsible professionals, and to guarantee

to them the freedom of action that is necessary if their professional role is to become a genuine one. This program is discussed in more detail in Section B.

j. Creation of improved curriculum content.

This is a cross-listing of a program to provide more appropriate curriculum content, following the general pattern of curriculum projects in the recent past. The basic point is that the skill of master practitioners is limited by the availability of worthwhile things for students to learn. This program is discussed further in Section 5.

k. The Creation of Appropriate Forms of Open Education

The most searching recent studies of education in the United States (Cf., e.g., (5), (26)) conclude that the very highest priority must be assigned to the development of appropriate forms of open education. We concur in this judgment. The urgency of such a program is all too clear, since "open education" is appearing so quickly in the United States that it deserves to be called a fad. However, at present it is often the shell of an idea, unaccompanied by the experiences, the detailed expertise, and the appropriate devices, procedures, and programs that can make it succeed. One more major opportunity in education will be lost unless these gaps can be promptly filled.

Nonetheless, we list "The Creation of Appropriate Forms of Open Education" as a separate program mainly for reasons of completeness. An effective attack in this area would consist mainly of guaranteeing that open education gets the emphasis that it deserves in all the other program areas discussed in this document. When exemplary practitioners are identified, the list must include an appropriately large representation of open classroom teachers, "open education" principals, and innovators working along "open education" lines. When exemplary practice is recorded on films, instances of open education must figure prominently on the list. When "teacher belief systems" are being analyzed, the beliefs of open classroom teachers must receive their full share of attention. When curriculum materials are being developed, a proper share of the effort must go into the development of materials that are fully appropriate to "open classroom" settings and are consistent with "open education" assumptions. If school-based teacher education programs are developed, a significant proportion of these must be based upon various forms of "open education" schools. This theme continues for every program considered. Indeed, some special priority must be given to open education, in view of the temporal imperative discussed above.

l. The Creation of "Teacher Centers"

Britain has pointed the way to the effective use of teacher centers as a means of allowing teachers to learn directly from one another, and for the propagation of the best practice. They also serve to bring teachers into direct contact with various experts, and thus constitute a partial solution to the problem of "isolation from the experts." Experi-

enced British authorities argue that effective teacher centers must be autonomous, and must not operate under the control of local educational agencies. Only those teacher centers which have been autonomous have succeeded in Britain. This autonomy is an important issue, not unlike the question of a governmentally-controlled television system, or governmentally-controlled churches. (55)

m. Creation of Resource Organizations

Teacher Centers can have only limited value unless there are other organizations with which they can collaborate. While they can tap teacher expertise effectively, they cannot tap the expertise of those outside of the official "education" profession. The occasional outside consultant is a waste of time and money--he cannot be sufficiently involved to reach an understanding of educational problems and potentials, nor spend enough thought on the matter to be able to function creatively. In Britain this need has been met brilliantly by the Nuffield curriculum projects, and in the United States one sees very promising beginnings in some work done by EDC. The creation and support of such organizations is a high-priority need, and one that is in danger of being overlooked. Their feasibility has already been demonstrated.

It is also essential to build on the best existing work.

Related programs: nearly all of Section 5 and Section 8, and elements of Sections 1 and 4.

n. The Creation of American HMI's

Some years ago Britain introduced a corps of HMI's --Her Majesty's Inspectors--for the schools. Originally "inspectors" in the supervisory or licensing sense of the word, the HMI's underwent a complete role change in the recent past. In their new role--somewhat akin to agricultural county agents in the USA--the HMI's are a resource available to teachers and principals, are able to identify outstanding practice and outstanding individuals (thereby functioning somewhat like athletic talent scouts), and are instrumental in helping teachers to share ideas with one another. Combined with central resource organizations (item 4-m, above), such a cadre could play a very valuable role here.

o. Studies of Organizational Constraints

It is impossible to talk with devoted teachers for very long without becoming strikingly aware of the constraints that they feel imposed upon them, often gratuitously, that prevent them from functioning to the best of their ability. This phenomenon deserves far more systematic study than it has received. What are typical instructional constraints? Are they necessary? How could teachers gain greater freedom for effective action?

5. Integrity of the Content and of the Total Experience

This topic might also be headed "Avoiding Isolation from the Experts," "Approaching Education as a Process," "Creating an Authentic Viable

Culture in Which Students Live," or "Maintaining the Teacher as an Adult Emulation Model for Students."

Dennison (33) speaks of "the natural authority of adults," but one might speak of this even more precisely as "the natural authority of competence." This authority is dangerously undermined by the common practices of asking teachers to teach things about which they are not expert, by trying to provide teachers with a hasty superficial expertise, or by trying to eliminate teacher expertise and prepare materials that by-pass teachers (or relegate them to the role of paraprofessionals) and speak directly to students. The problem is exacerbated by the practice of regarding the teacher as omniscient, and teaching via a "rhetoric of fact" --thereby denying creative teachers the opportunity to admit mistakes, and to learn things side by side with their students.

It is impossible to look at education today without raising questions about the authenticity and integrity of what is being learned. Are students learning what they need to know, and are they learning it from an appropriate point of view? This was the basic question raised by all of the course content improvement programs of the 1950's and 1960's, and the full impact of this question has not yet been recognized. The traditional orientation of education is not to deal with this fundamental question, but to focus instead on the lesser question: can we produce certain severely delimited behaviors by more efficient programs of training? Yet if education continues its present preoccupation with this latter question, we will inevitably face even more severe crises of isolation, lack of relevance, disaffection, obsolescence, and dissatisfaction.

Program Area 5 deals with the question of assuming that students are learning what they want to know and need to know, from appropriate points of view.

a. University Programs Designed to Promote Teacher Scholarship Within Subject Areas

At present there are few opportunities for elementary and secondary teachers to develop scholarly competence through work done in universities. In general, graduate courses are too advance, too specialized, and have too many pre-requisites to be useful to teachers.

Some improvements have been made via "summer institutes," "academic-year institutes," "in-service institutes," etc., but the general problem is by no means solved. Progress has perhaps been greatest in highly specific and highly novel areas, such as digital computing, where starting de novo is more feasible.

Nonetheless, there are precedents, and they are encouraging in thinking about what can be done. Britain has some exemplary programs, for example, for secondary mathematics teachers. Similar problems exist also for many college teachers. It is possible to let many teachers participate in

creative, "scholarly" work--not necessarily at the outermost frontiers of human knowledge, but at the frontiers of the teacher's own knowledge, which is the important point.

These programs tend to be more effective when they deal with reasonable problems "scaled down" to manageable size, as in the case of the "intermediate inventions" discussed in Section 5-c, below. They also gain strength, for a similar reason, when the "frontier knowledge" can also be recognizably related to teachers' own work with children, for example because of the participation of curriculum resource organizations such as EDC's ESS, etc. (Cf. programs 1-b and 4-m.)

b. New Course, and New Reorganizations of Knowledge

Knowledge is expanding rapidly, and is being continually reorganized around different central ideas. Both processes must be reflected in educational programs. The student of the future cannot fight his way to the modern frontiers of knowledge by gradually working his way through every earlier conceptualization, by--in effect--retracing the tortuous path of history. The creation of new courses and new reorganizations of knowledge is an area in which it is possible to find excellent work presently being done, and in which it is relatively straightforward to move ahead. The main task is one of careful selection of the curriculum areas, and of the curriculum innovators themselves.

c. "Intermediate Inventions".

This phrase was first popularized by David Page, who has been one of the leading developers of intermediate inventions, an "intermediate invention" is a scaled-down subject matter which preserves the integrity of the basic subject, yet which renders the subject more amenable to creative work by students who are novices, or relatively immature. Well-known examples would include many recent units in elementary school science; Page's own work in mathematics (26, 56, 57); the Carl Orff music program (and the Papert music program now being developed (58); the well known PSSC high school physics courses; work by Teachers and Writers Collaborative (59) in relation to creative writing (see also (26) and (46)); and the famous Pitman ITA (Initial Teaching Alphabet).

The creation of appropriate intermediate inventions is also a matter of central importance, and one where progress can be guaranteed in return for well-selected investments.

d. Going Outside the Institutions.

Students in college, high school, and even elementary school are finding that one way to guarantee relevance is to go where the action really is. Philadelphia's Parkway Project is probably the best-known example at the high school level. Sabbatical semesters, internships, and work-study programs play a similar role for colleges. Programs in this area may not require direct funding, but should be kept in mind in the design of other programs; the solution of other educational problems can make these out-of-school programs both more valuable and more feasible.

Indeed, a key role might be played by the Community Learning Centers.

e. Community Learning Centers

These would be places where people of diverse ages could go to study a wide variety of things: reading; how to behave as a parent; the study of contemporary legal and social institutions; how to repair automotive transmissions; how to run a small business; how to run a stock investment club; how to converse in Russian; etc.

Such institutions have been proposed as an alternative to high schools; in this usage they would give students more control over their own educations, and more control over their daily schedule (so that simultaneous part or full-time employment would be possible).

Some prototypes of such institutions already exist; further developments need to be studied carefully. Should such Community Learning Centers be part of (perhaps a large part of) existing universities? Can they be incorporated into any new open universities (see Section 8-e)? What role can they play in mid-career vocational changes? How can they avoid condescending to their clients (who will, after all, cover a very broad range of competences)? How comprehensive can they be? How will they relate to a growing use of educational television? (60)

f. Mini-Courses

At the present time many high schools are introducing "mini-courses" in special topics, at either student or teacher initiative. Typical courses deal in foreign languages, fencing, skin-diving, water skiing, French cooking, Chinese cooking, the role of the United Nations, horseback riding, guitar playing, movie making, photography, personal grooming, astronomy, amateur dramatics, etc.

These courses may have a greater potential than perhaps first meets the eye, because many of them represent quite serious teacher hobbies and outside interests. Thus they represent another route to establishing "the natural authority of the expert," by turning to an area where the teacher is both an expert and an enthusiast.

A high school liberally provided with such mini-courses might be a more vital and authentic place, where adults and teen-agers could get to know one another in new ways, and where the expert authority of the teacher might be established in the most natural way possible.

Outside experts might also be involved, thereby further lessening the isolation of young people from experts. Indeed, students themselves might teach such courses and thereby open the door to a quite different form of interpersonal relationships, and a different sense of community.

g. The Creation of Resource Organization (This is a cross-listing of item 4-m).

Serious improvement of course content quite demonstrably depends upon vigorous, high quality ad hoc institutions devoted to this purpose,

as ESI, SCIS, etc., demonstrate. At the same time, such organizations are relatively inexpensive and can lead the way to such deeper forms of educational improvement--as, again, the history of ESI-EDC makes clear.

Small cadres of HMI's can work especially effectively when attached to such institutions.

h. Creation of Courses in New Areas

Various consultants--especially the anthropologist Laura Nader--have urged the creation of programs of study in areas that are almost wholly neglected at present, at least below the college level. F[illegible] Americans, for example, understand very much about their own culture, laws, and social institutions. This could be remedied, at least in part, by "anthropological field work" done in studying one's own culture. This is probably one of the more important things for people to know.

i. Mid-Career Programs to Recruit Experienced People into Teaching

There is considerable evidence of the desirability of having many teachers whose personal expertise has been developed by work experiences outside of school--former lawyers, newspaper reporters, engineers, Air Force officers, etc. Some mid-career programs to attract such people into teaching exist; a more systematic attack could be developed.

j. Coping with the Knowledge Explosion.

In 1972 it is nearly embarrassing to speak of "the knowledge explosion." So much has been written about it that little new can be added. To make matters worse, recent events have made everyone so conscious of disaffection on the part of young people, of school programs that fail in gross and evident ways, of drug use and violence, of drop-outs at all levels of education, and even of wide spread unemployability, that a concern for the rapid transmission of sophisticated knowledge sounds almost like a misplaced priority. But despite much talk and competing priorities, the fact remains that knowledge is being enlarged at a rate so rapid that few people comprehend it. And most people are left out entirely. How many dentists are au courant of recent technical advances in dentistry? Or, each within his own field, how many physicians? Teachers? University faculty? Automobile mechanics? Foreign affairs analysts? Engineers?

Various programs suggested here may help a little: proper "intermediate inventions" (5-c) can make sophisticated knowledge available in simplified but undistorted form to many more people--for example, students in the upper elementary grades and in high school. Indeed, contributions already made by existing intermediate inventions need to be recognized and utilized more fully, and the existing programs to create intermediate inventions--primarily within the National Science Foundation--need to be expanded signficantly, probably by cooperation between NIE and NSF. The "Community Learning Centers" (5-3) can help, and so can more efficient re-organizations of existing knowledge(5-b).

Nonetheless, it remains possible that some distinct planning should be devoted explicitly to the task of finding ways to cope with a knowledge explosion that, rhetoric aside, is both real and deeply important.

6. Remedying the "Isolation from Consumers"

The earlier discussion has argued that schools are dangerously isolated from consumers, whether one construes the consumers to be the children or their parents. Part of this is an absence of choice on the side of students and parents, but this quite serious problem has a relatively simple remedy: provide signficant, bona fide choice to students and to parents. Part of the problem is a lack of information available to parents and students--the absence of "consumer education." Parents and students are unaware of alternative possibilities (e.g., of "open education"), they do not have access to adequate descriptive date and records, and they are not provided with discussions of the advantages and disadvantages of the various possibilities.

Finally, parents have no way to make significant inputs into their children's education. This last point is of special importance for the growing number of educated parents whose own education may be better than the teacher's education, and who may know quite well the inappropriateness or erroneousness of what is being taught to their children in school.

These difficulties reach to the heart of mass compulsory education in a free society. Without claiming unrealistically simple solutions, one can describe general programs devoted to the four aspects of this problem: lack of choice, lack of access, lack of comparative information, and lack of opportunity for inputs.

Two basic patterns are presently being tested that relate to choice: choice within a public school system, and choice that is not restricted to public schools.

a. Choice within a Public School System

This is already being attempted on a trial basis, for example at East Hill School in Ithaca, New York; at the World of Inquiry School in Rochester, New York; in the Berkeley, California Experimental Schools Program; at the Nova School in Florida; and elsewhere.

What is an appropriate Federal role in assisting such efforts?

i) For choice to be meaningful, there must be diversity. Federal programs can help to create this diversity (Cf. Section 7 below.)

ii) School superintendents seeking to create diversity and to provide for parent/student choice face many obstacles in terms of winning staff acceptance, winning community acceptance, and obtaining enough exemptions from restrictive regulations to make the program feasible. Federal programs could provide assistance in each of these areas.

iii) Where parent groups desire greater diversity, Federal programs

could facilitate clarification of parent group aims, could make it easier for parent groups to present their case to school authorities, and could make it easier for school authorities to respond.

iv) Where--as in the Rochester World of Inquiry school--a school goes beyond a single local educational jurisdiction, programs could be created to help solve jurisdictional and cost-allocation problems.

b. Choice Outside Public Schools.

In a nation that has long prided itself on consumer choice via market place presentation of alternatives, this is an important option. The obvious kind of program here would be one or another version of the "voucher" system. In order to go ahead with this system, it is important for teachers, administrators, parents, students, and taxpayers all to see how a voucher system can work to everyone's advantage. Few Americans would argue for the socialization of our various consumer-oriented industries; who would argue for continuing the present government monopoly on school operations, if alternatives were clear and feasible.

Programs in this area would build on the present OEO experiments with vouchers, and on present planning work done by Jencks, Sizer, and others (61, 62).

Concerning the problem of the present lack of entry into schools, that is to say, the fact that most parents don't know what happens to their children in schools, and can't find out: probably the main alleviation of this problem will come indirectly through other programs. As bona fide choices become available, a school will have less need to be secretive, since students will be there by choice, and the school in general will be promoting values and practices with which its clientele largely agree. Moreover--given choice and diversity--it is reasonable to assume that some schools will be very open to visitors, while others will be closed, in each case because the staff and clientele prefer it that way.

Two programs, however, deal especially directly with the problem of lack of parental access to schools:

c Influence by Demonstration and Example.

Federal programs can exert an appropriately modest influence toward easier access to schools by the example they set in school operations which they do control or shape. An instance is presently in operation: the OE Day Care Center at FOB 6, 400 Maryland Avenue, SW, Washington, D.C. Parents spend one day a month working in this day care center (different parents being there on different days) so that the center operates "in a fish bowl". There is virtually complete information automatically and directly available to parents because of this first-hand observation and participation.

d. Educational Programs that Operate Outside of School Buildings.

Programs such as the Philadelphia Parkway Project, where educational experiences occur outside of school buildings, offer obvious

opportunities for direct observation by parents and the community at large. (Cf. Section 5-e)

Concerning the lack of comparative information: Federal R&D efforts fit especially naturally into this area. The program to develop studies of subtler variables should make a major contribution here: for example, development of more accurate ways of describing institutional milieu, more accurate ways of describing group activities, and more accurate ways of describing individual performance levels. Also, more accurate ways of describing individual differences would be helpful in determining that individual students are in fact being treated in ways that are appropriate to them and beneficial to them. (Cf. Sections 3-a, and 3-c through 3-m)

Further, the clarification of alternatives--both alternatives in actual school practice and theoretical differences in the sense of the paradigm controversy, provide a basis for students and parents to make choices.

Information has no impact on those who don't have the information. Even if considerable descriptive data is collected about the effects of different kinds of educational experiences, this will form a basis for student and parent decision-making only to the extent that they know about it. (By analogy, the data on the harmful effects of cigarette smoking didn't change people's behavior much until it was brought home more forcefully, e.g., via spot television statements.)

A very constructive Federal role is possible here, to make sure that parents and students are aware of the existence of some alternatives, and that they have the necessary details to choose wisely. Federal programs to inform people about alternatives might include:

e. Use of Films that Document What Life is Like for Students in Different Kinds of Learning Situations.

These must be carefully controlled documentary films, totally authentic, and not promotional or propaganda films. They must be unscripted, presenting an accurate record of what transpires in the various educational settings. (This is really a special use of the films discussed in Section 4-c.)

f. Other Forms of Informational Programming, on TV, or Otherwise (E.g., Discussions of Alternatives).

Television stations presently donate time for such programming; perhaps the only additional cost would be to make available additional resources, such as knowledgeable consultants or appropriate short film clips.

g. Production of TV spot announcements.

(The NEA presently airs some spots of this type, calling attention to some educational possibilities that parents and students may not be aware of. Some state government agencies do likewise.)

h. Museum Exhibits Could Demonstrate Educational Alternatives.

i. "Store-Front" Schools, Open to the Public, could Demonstrate Alternatives.

Concerning the lack of opportunity for parents to make significant inputs: again, major gains can come indirectly from other programs, especially those that create diversity and choice. Especially relevant would be outside-the-school-building experiences, and school programs that invite parents in to share their expertise with children. Special additional programs of this sort could easily be devised:

j. Citizen Service Programs

These would be programs along the broad lines of the Peace Crops or VISTA, Except that they would probably be mainly part-time work-schedule programs, allowing knowledgeable people to work with students on some sort of part-time basis. They would differ from present school volunteer programs in that they would generally be paid programs, not volunteer ones, and they would be specifically designed to give experts a favorable opportunity for sharing this expertise with young people.

k. Citizen-created Schools

In Berkeley, California, Herbert Kohl and a group of collaborators started an independent school, named Other Ways. After operating it successfully for a period of time, they turned it over to the Berkeley Board of Education, which has "adopted" the school and now runs it as part of the Berkeley Public School System. This could be one of the most important precedents for the future of American education, and may be a major pattern for self-renewal.

Finally, there is one other form of isolation, possibly the most serious of all: the culture of schools is often so different from the culture of the student that the student is unable to bridge the gap. Two programs address this problem:

l. Schools and Local Culture

It is obvious that programs can be devised--in many cases, have been devised--to develop a better match between the culture of the student and the culture of the school. (63) Federal programs to facilitate this process can surely be designed.

m. "In-and-Out" Schools

Programs also have been devised to make it easier for students, who have dropped out of school, to continue to attend on a part-time basis, to return at a later time, or to continue their education in other forms. The Newman report on college education calls for a similar emphasis at the college level. (64) As the Newman report suggests, Federal programs aimed to facilitate this are surely possible.

7. Coping with the "Diversity Gap"

Earlier sections have argued that the sameness of nearly all schools is one of the most striking aspects of education, and one of the most limiting. The United States is producing one single model of the educational experience, at a time when it is all too clear that that model doesn't meet the needs of most students. We need far more variety among schools and among educational opportunities.

a. Innovations that Open Up New Possibilities

Innovations can generally be classified as those that "satisfy the need for change," thereby establishing a new status quo, vs. those that create a drive for still further changes. Given the present severe problems facing today's educational procedures and institutions, changes of the first sort will not ordinarily produce a satisfactory resolution of major difficulties. Rather, they tend to be merely cosmetic, to make things "look better" in the short run. Students of innovation speak of those innovations as ones which encounter "nullification through partial assimilation."

b. Small-sized Schools

Various writers have made a cogent case, especially at the elementary school level, for more small-sized schools (38) . These can be more manageable, and can more easily be steered in new directions. (They can also be more humane, since they are "people-sized" institutions.)

Federal programs that assist in the development of such small schools ("mini-schools") could easily be designed.

c. "Protection of Infant Institutions

Studies have indicated that many small schools are started with highly innovative approaches, but usually founder after a few years because they lack adequate financial support. Thus, innovation and diversity may merely be necessary to protect those schools that are "tender young shoots of new plants." Programs to accomplish this could easily be designed.

This protection of promising but immature institutions is, in fact, a familiar role for which there is ample precedent in, for example, small business programs, black capitalism, protective tariffs, and anti-trust laws.

d. Independent Schools

This is a cross-listing of program 6-k: creation of independent schools which can subsequently be turned over to the Board of Education for operation within the Public School System, following a pattern that has been used in Berkeley, California.

e. Marginal Innovations

Many present innovations are so marginal in size that they connot achieve their real potential. In one instance, a promising "open education" program in a single elementary school in a small town is operating within such tight constraints that it can barely depart from traditional practice:

i) It feeds into a traditional 7th grade program, and therefore devotes much of grade 6 to "getting children ready" for the traditional 7th grade program--despite the fact that no one would defend the 7th grade program as particularly valuable.

ii) It has no opportunity to recruit interested or specially trained teachers. Once again, education treats people as interchangeable parts. Who would try to run an airline with a random collection of transportation workers serving as pilots, without regard to their interests, experience, or training?

iii) Other schools in town are ignoring the experiment (a very common phenomenon).

iv) The project has no facilities for extensive re-training of its present teachers.

v) The project is not effectively communicating with other similar projects elsewhere.

How can such a project produce anything very different from what presently exists?

A Federal program to identify marginal innovations of high quality and potentially great impact, and to arrange for them to achieve this impact, may well be the highest priority for NIE in creating significant alternatives in education.

f. Cross-cultural Studies Intended to Discover and Describe New Possibilities.

The biggest innovative excitement in US education today probably comes from the recent "discoveries" of significant alternatives that have been developed in Britain.

Where are there other important alternatives that might prove valuable here? And--most important--can we study them in enough detail to find out why they work well and then develop just what we must do in order for them to work equally well here?

Many other programs suggested in this document would greatly facilitate the creation of more diversity, especially programs that provide resources to teachers and administrators, programs for the reorganization of structural organizations that impede progress, programs that develop new and workable materials and programs that facilitate the process of innovation itself.

In addition to programs such as the above that are intended to create more diversity, there is an urgent need for programs that attempt to make the most of existing diversity, meager though that may be. This includes programs to provide more parent and student choice (such as voucher

programs); programs to provide more information to help parents and students exercise this choice wisely; programs to identify innovative programs and to record them on film and otherwise; the development of ways to study subtler variables, so that the differences among educational settings will be revealed more clearly; studies of organizational constraints that inhibit innovation, and the development of means for circumventing these constraints; careful historical studies that record what has been done in innovative programs (togeher with a detailed picture of what worked, why it worked, what failed, and why it failed); and programs to nurture new, promising, but insecure innovations. One program of this latter type deserves specific listing:

g. Technical Support for Innovators

An impressive number of teachers and administrators want to develop innovations based on their own experience. They often lack technical knowledge--especially in the area of legal possibilities and limitations, in the area of quality resources of various sorts, and in the area of economic planning--that could easily be made available to them, at small cost if it were done centrally on a wholesale basis.

8. Questions of Organizational Structure

As mentioned earlier, one cannot talk long with teachers without becoming aware of the large number and oppressive nature of constraints which they believe limit their actions and circumscribe their possibilities. Probably no significant program of improvement can succeed that does not address itself directly to this problem.

It also becomes clear that there is almost no inherent pressure within education toward quality. Where can such a "drive toward quality" arise? Almost certainly, not from external requirements which will produce more unenthusiastic compliance than real enthusiasm, and which will, at present, tend to be described and measured in simplist terms that will not catch the true nature of quality. Where else, then? Probably from an increasingly discriminating clientele, and from a devoted professional staff. But at present (despite unjustified euphemisms), education has few professional roles. Teachers are by no means treated as professionals. Nor are they educated as professionals. If quality is to come from a determination of devoted professionals, we must create a cadre of such professionals. That means identifying them, recruiting them, and educating them, as professionals; and then employing them in roles that give them the freedom, responsibility, and rewards of professionalism.

A third and final comment on educational organizational structures reveals another side of this problem-- the so-called "take me to your leader" problem: within education it is in the main impossible to find the responsible professional, the autonomous decision maker. Everyone believes he is responding somewhat defensively to constraints and trusts that are initiated somewhere else. No one (in de Charms' language) is an

"origin," everyone is a "pawn." There is an urgent need to identify some real cadres of responsible autonomous professional.

The two favorite candidates are:

i) make the principal the autonomous responsible professional or else

ii) make teachers the responsible autonomous professionals. A very compelling case can be made for NIE to put both programs high on its list of priorities. Two programs address this problem:

a. A Program to Establish Principals as the Dominent Responsible Professionals.

The pattern proposed here follows the direction of present British practice. The principal (usually called Headmaster or Head Teacher) is the clearly identified dominant responsible professional. He is not primarily an administrator--he is a carefully-chosen teacher, nearly always a very superior teacher. He continues to teach children. He trains and assists the other teachers in his building. His personal decisions shape the curriculum and the pedagogical styles used in his building. There is no doubt that he is in fact the dominant responsible professional, playing a professional role.

A similar pattern has been attempted in a few school systems in the United States. One school system has even sought for its principals a special exemption from the state school code, including freedom to bargain with individual teachers over salary, and the right to allocate funds according to the principal's best judgment. (This same school system has proposed the elimination of the hierarchical structure of its school administration, and the limination of all levels of middle management.)

The urgency for exploring such directions becomes clear as one observes the fact of having no identifiable responsible professionals in the present system, and when one sees the consequences this has for children and for the transmission of culture to future generations. (The financial crisis of schools also add pressure for some such reorganization.)

b. Make Teachers the Responsible Professionals.

This program is similar in intent to Program 8-2, but would establish teachers as the dominant responsible professionals. The program would make the per year, per student funds available directly to each individual teacher, who would hire a paraprofessional if she desired, negotiate salary, buy computer time if she desired, select instructional materials, etc. A group of teachers--self-selected as much as possible--would acquire (probably by paying rent for it) the space they need for their "school," and could, of they chose, hire a building administrator. They would also continue his employment, or terminate it, by their decisions.

The effectiveness of such a program depends heavily upon the availability to teachers of such responsive resource organizations as teacher centers and curriculum resource organizations, and upon methods of sharing knowledge among teachers. Especially successful ventures would be recorded, studied, assisted in various ways, and might become centers for teacher education and research.

The creation of a genuine professional role for teachers should facilitate recruiting highly competent and broadly-experienced people into teaching (e.g., Program 5-i).

Independently of efforts to identify and establish a responsible professional cadre, there is a need to study and modify the present hierarchical organization of school systems, which grows increasingly expensive, increasingly unwieldy, and increasingly unresponsive. It is both a result of the isolation problem, and a major cause of further isolation.

c. Studies of Organizational Constraints.

d. Experiments with Simplified Organizational Structures

Finally, since new organizational forms are appearing one needs:

e. Studies of newly-emerging organizational structures, such as, for example, the open university (65, 66).

9. The Process of Innovation

The innovation process itself has been studied, especially in agriculture (67) and in societies undergoing change (these latter studies are undertaken primarily by anthropologists). The process requires both study and effective action, for the fact remains that innovations in education are rarely adopted, and if adopted at all, are usually diluted to the point of ineffectiveness. Why is this so? What can we do about it?

Given the general impression of school systems as large, inflexible bureaucracies, without identifiable responsible professional practitioners, with no clear cultural commitment, with no adequate rhetoric for communicating any but the most simplistic messages, with little freedom of choice on the part of any student, parent, teacher, or administrator, and with nothing but the most trivial theoretical understanding of basic processes, the failure to respond to innovations--or even to any but the most flagrant emergencies--is perhaps not surprising. Add to this the lack of public agreement as to goals, and a failure to adopt innovations becomes virtually predictable.

Certain obvious programs can nonetheless be devided to clarify some of the details of this picture. Foremost among these would be the studies of institutional constraints suggested earlier (8-c). There could also be:

a. A National Inventory of Successful Innovations and Innovators.

Despite all that has just been said, there are men and women who have preserved and implemented important innovations. It would be valuable to know who these people are, what problems they have faced, and how they have surmounted them.

Related programs: 1-a - 1-c, 2-b, etc.

b. New Methods for Seeking Out New Ideas from the field.

c. Detailed Studies of Attempts at Innovation. (This is really a part of program 3-m.)

d. Studies of the Contradictions Inherent in Various Proposals for Change.

e. An Action Program to Develop and Install those Innovations that Lead to Further Innovations (Program 7-a).

f. Programs that further Diversity and Choice (Section 7).

D. PLANS AND PROCEDURES FOR THE IMMEDIATE FUTURE

The present discussion of the "quality of education" is one draft in a sequence of successive approximations. It requires at least one further revision cycle before it is ready to be used as a foundation for program planning. This revision cycle begins immediately. It will involve:

1. Determination of some priorities among the suggested programs.

2. Development of arguments pro and con for the various programs.

3. Surveys of the present state of affairs, e.g., the results obtained thus far in some of the on-going experiments cited.

4. Assessments of the present state of knowledge in the various relevant areas.

5. Identification of which assumptions and implications within the document are born out by evidence and expert opinions and which are not.

6. Identification of major mis-statements of problems that may have occurred.

7. Identification of conspicuous omissions.

APPENDIX A:

METHODS OF DOING BUSINESS

The impact of an NIE will depend not only on what it tries to do, but also on how it goes about doing it.

No other item deserves attention more urgently than the question of how NIE will do business, what its ground-rules, assumptions, and priorities will be. By its actions, an NIE can increase the isolation of teachers and students, or it can go a long way toward reducing this isolation. It can increase diversity, or reduce diversity and promote uniformity. It can enhance quality, or it can enthrone mediocrity. It can do all of these things in ways too numerous to mention--nonetheless, a short and incomplete list follows, intended to show, in somewhat more concrete terms, the kinds of things that are involved.

In creating new programs and new ventures, an NIE can start from arbitrary personnel and assumptions, or it can carefully survey what exists, what has been done, and what is in process. Clearly, it must take a careful look at what exists.

> Robert Reinhold, reporting on a $900,000 program at MIT intended to study the effects of introducing new technology into under-capitalized nations(68) , writes: "Foreign aid experts have seen it happen many a time. A well-meaning company or government agency builds a highly automated factory, to make plastic sandals, for example, in an underdeveloped region. The modern efficient factory might have been expected to bring economic boom to the area, but it doesn't quite work out."
>
> "As it happens, the plant turns out such an inexpensive and high quality product that the indigenous shoe industry, dependent on time-honored hand methods, is wiped out and the region's dire unemployment problem is exacerbated."
>
> "The lesson? The technology that worked such wonders in our expensive-labor, cheap-capital economy cannot necessarily export it with happy results. This might seem almost painfully obvious but the problem of 'technology transfer' remains one of the knottiest facing development officials."

The problem of creating competition is especially important in educational R&D, which is traditionally an under-capitalized area.

Small-sized, low-visibility programs exist in every aspect of education--new approaches to reading, new regoranizations of knowledge, new uses of technology, new ways to analyze student-environment interactions, new awarenesses to different forms of student learning and performances, new kinds of learning experiences in new subject areas, etc.-- and, while many of these never get to the stage of showing real promise, some of them do. Some of these small, low-visibility programs exhibit considerable ingenuity, possess dedicated and energetic personnel, and demonstrate a subtle and profound understanding of what they are doing.

Should an NIE--or any other agency--ignore these small but potentially very valuable efforts, and create a large, well-funded, high-visibility effort in competition with them, one will have the problem of Reinhold's plastic sandal factory--small quality operations will be run out of business by competition they cannot match, and replaced by a large organized effort which, having been started more by proclamation than by the personal devotion of its creators, will probably operate at a mediocre level of quality.

Such considerations provide an important guideline for the operation of an NIE, which is essentially a strong recommendation to look carefully before you leap. The question of how to carry out this looking, in programmatic terms, will be dealt with below, in the section on programmatic recommendations. In general terms, the admonition must say: Don't create large programs or projects by proclamation from Washington--at least, not until after a careful study of those efforts that already exist. This study must go beyond being a library search of a few research journals, for creative teachers, administrators and curriculum designers do not necessarily publish in such journals. The search must not be confined to the most established institutions--neither just to major universities, nor to officially-recognized R&D institutions, not to schools of education, nor to public schools. Important innovators may be found anywhere-in Parochial schools, in small colleges, in urban store-front schools, in museums, in "free schools," and so on--and they may wear a great diversity of official labels--chemists, anthropologists, kindergarten teachers, computer specialists, sociologists, historians, school principals, or school superintendents. They may be film makers who are exceptionally good at recording, without disrupting, what takes place in a classroom; critics of schools who are extraordinarily acute in identifying practices that are proving unsatisfactory; sculptors or jazz musicians who are effective in getting young people committed to career ambitions; curators of museums who create enviornments in which young people learn; social workers who can get groups of youngsters to understand themselves and their peers, and help them work together toward constructive goals and personal growth....

Education may be heavier than air, but there are men and women out there who can make it fly. We must find who they are, and how they do it.

What to Look For

In the process of studying efforts already underway, in "looking" before you leap, what do you look for?

a. In terms of people, you look especially for commitment--for the person Michael Timpane (69) has called "the passionate innovator," for that determined sort of person who will often have run extensive preliminary trials, or started his own school, or developed careful plans even before there has been any promise of possible funding.

b. You look for quality. One of the most common disappointments is to come across an innovation that is not without interest, but where some essential aspect is simply not very good. Some deficiencies should be overlooked, since they can be remedied later--but a general overall lack of quality is not something that can be overlooked. It cannot easily be remedied later on; remnants of fundamental deficiencies will linger on indefinitely.

c. You look for the extent of improvement over current practice. Another common disappointment is to fund innovations that represent, at best, exceedingly small modifications of present practice, and exceedingly little improvement. Supporting such work is merely polishing up an old and unsatisfactory product.

d. Don't judge merely from proposals. Some people talk a good fight, some fight it. Some people do both, but they are not numerous enough to justify judging the fight on the basis of the talk. In short, don't use written proposals as the sole criterion for making decisions; to do so will favor good proposal writers, who are not necessarily the most ingenious innovators, and will exclude those very important innovators who are not good at writing proposals. Judgments must be based on the people and their actual work, both being observed as directly as possible.

e. Don't overlook skilled craftsmen. In an age when the practice of the best practitioners is ahead of the theory of the best theorists, don't overlook skilled practitioners. They are the men and women who are making education fly, and we must, in fact, find out how they do it.

f. Don't look for orthodoxy. No theory of education, no paradigm of educational practice, is presently so flawlessly successful that it can be granted a monopoly. Very noval approaches may be what is needed--don't limit acceptable practice to that which is recognizably orthodox. Be receptive to conspicuously different alternatives.

Creating New Institutions

Education needs new forms of organization, and, indeed, new forms

are already beginning to emerge: Regional Labs, R&D Centers, curriculum innovation projects, teacher centers, educational analogues of agricultural county agents, one-man independent schools, store-front schools, industrial education programs, schools-without-walls, universities-without walls, new forms of educational television, children's museums, new forms of day-care centers, new forms of experimental schools, new forms of community colleges, new forms of mid-career education, and so on.

An NIE will have relations with many such new institutions, and may itself create some. Whenever NIE is considering the creation of a new institution, certain guidelines must be worked out--in addition to the admonition, presented above, not to wipe out existing efforts by the unthinking intrusion of massive competition.

One of the most important of these deals with questions of permanence. For NIE to create institutions of great permanence will ordinarily be an error, for such organizations may easily outlive their usefulness. The educational landscape is already littered with the remnants of organizations which no longer contribute to the solution of important problems. Thus, a Regional Lab should be close to a university, be staffed by personnel on leave from the university, and hence be able to play the role of a temporary institution without at the same time playing havoc with the careers of those who work there. By seeking to involve many different colleges and departments within the university, the Regional Lab can contribute to ending the isolation of pre-college education at the same time that it helps solve important educational problems. Universities are probably the ideal institutions to play this "reserve" or "over-flow" role, because one of their main traditional functions--in addition to providing education and carrying out research and scholarly activities--is to maintain a large pool of expert personnel who are available, as needed, to other sectors of society.

On the opposite side of the permanence question, once it has been established that an institution is not driving out alternative approaches by constituting a monopoly that limits competition, once it is established that the contribution of the institution is, in fact, of high quality and significant promise, once it has been established that an institution is diminishing the isolation of education and not increasing it, then the institution is entitled to reasonable guarantees of continuity and autonomy. Nothing valuable can be expected from instutions that exist only from day-to-day nor from institutions that are subject to "remote control" manipulation from funding agencies.

Begin with People and Ideas. In building organizations, one can start by building the organization first, then asking what it can do. This virtually guarantees mediocraty, since it guarantees (among other things) a lack of commitment to the final purposes. Experienced R&D managers recommend that one start with the ideas and the people. If these are right, the organization can be left to evolve as it is needed. This guarantees a subordination of form to function, a necessary condition for achieving high quality.

Working with Institutions

Institutions, once properly started, must enjoy reasonable continuity, but that is not enough. They must also enjoy considerable autonomy. Critics of past R&D management procedures have noted a tendency for too much direction to emanate from funding agencies. If the funding agency knows people who can see what should be done better than those who are presently at work, then the agency has just found the people who should, themselves, be doing the job. Let them do it; don't use them to interfere with someone else's work.

Attitudes Toward the Future. The future cannot be predicted. Critics point out that one consequence of the heavy developmental emphasis in defense and space R&D has generated quite unrealistic expectations that significant innovation can take place under management by "five year plans." Such plans may (or may not) be appropriate for socialist economies, but they are not appropriate in a really innovative exploration of genuinely new frontiers. Instead, one must seek a flexible and intelligent use of nearly instantaneous feedback--if planning is the key to successful development, flexibility and adaptability are the keys to significant innovation.

Theory

Given the present extent of differences of opinion in educational practice and in educational theory, when looking at R&D ideas an NIE must have the attitude of friendly scepticism toward any plausible conceptualizations; and must have a generous appreciation for alternative methodologies--even quite unusual ones. Critics of educational R&D have called attention especially to the apparent rejection of all but a narrow range of methodologies. There are many different ways to try to understand it and to improve it. Contrasting an experimental group with a control group is not "the method of science"--it is one method among many, and by no means always the most appropriate road to deeper understanding or to more effective operations.

ALTERNATIVES TO THE "LINEAR" MODEL OF R&D

Again looking to past practice in R&D in space, defense, etc., one often assumes that the only feasible arrangement for R&D is the so-called "linear" arrangement. The linear arrangement assumes that work begins by seeking, and ultimately finding, some basic information or techniques. This is called "pure research," or "basic research," and it is ordinarily assumed to occur in special laboratories, removed from everyday affairs, and devoted to the meticulous study of simplified abstract models of more complex realities.

The very basic discoveries produced by "pure research" are then used as the foundation for creating practical devices as part of a large-scale "development" program. Development programs, in their turn, are also usually thought of as occurring in special places, and as being carried on by special personnel.

If development is the second state in the linear model, "dissemination" or "installation" is the third stage.

The important point for an NIE is to recognize, from the outset, that the linear model has its critics, who have pointed out serious deficiencies in the linear model, and who point out that alternatives do exist. R&D can be carried out in other places, and in other ways (Cf., e.g., (70) .

Criticisms of the linear model include the following: the various stages do not fit together well (70), since for example even well-intentioned developers do not see a child as his own teacher sees him--each stage in the process is at least somewhat out of step with the other stages, and often badly out of step; to the extent that, as Hawkins says, the best practice is ahead of the best theory, it is not possible to build high-quality programs by starting from "basic research"; the problems that need to be solved are usually first recognized by firing-line practitioners (in a medical instance, this was the case with thalidomide) within education, (5), and some of the best ways of approaching them are usually worked out by firing-line practitioners; many important innovations have been developed by working directly with students in reasonably typical settings (26) , and seem to be things that would never have developed without direct student involvement; E.D.C., possibly the most experienced and most successful curriculum innovation organization in the United States, has evolved away from a linear model, and toward a collaborative model; much of the most important kind of improvement in education can only be made by a rapid sequence of small steps, successive approximations, "backing-and-filling," and this process cannot be carried out within the massive, ponderous form of the linear model; the linear model makes major changes in our schools (and hence even in our society) dependent upon the accuracy and adequacy of our theories, and this is too risky a gamble to make (we run the risk of educational analogs of the thalidomide disaster); if you can identify the key responsible professional practitioners within education (presumably either teachers or principals), and give them the means, the freedom, the mandate, and the education to act, they (and they alone) can produce continuing progress with minimum risk (55) ; the linear model, in producing common materials for a great diversity of people and settings, averages over so many differences that it tends to destroy the essential integrity of otherwise good ideas (a problem familiar to major textbook publishing houses); in the past, some of the best improvements (say, in a better chemistry textbook) have come from a creative teacher who has had years of experience teaching the course in question, who has had the freedom to modify the course as he has seen possible improvements, and who finally incorporates all of this experience into his textbook--but this is <u>not</u> the linear model, at all; and, finally, the linear model is expensive, ponderous, unresponsive, and leads to the building of a political constituency that comes to oppose further change--an educational analog of the military-industrial comples.

There are Alternatives. Indeed, three or four alternatives have been alluded to in the proceding listing: identifying the key responsible

practitioners is essential for better education in any event, and if this can be done, a sizable part of the R&D job should directly involve these key professionals (55); one way to help these key professionals to become more effective innovators is to identify the best of them, and provide them with the freedom and resources which would enable them to carry on firing-line R&D efforts; one mechanism directed toward this end would be an American adaptation of the British system of HMI's; another would be the introduction of "teacher centers" (55) ; even excellent practitioners often require the assistance of innovative and responsive resource organizations such as EDC (in the USA) and the Nuffield curriculum projects (in Great Britain); and still other methods can be found for helping teachers, principals, and resource personnel who work closely with teachers to play a far larger role in carrying out creative R&D. The linear model has teachers involved in R&D only as recipients of other people's work (or, occasionally and marginally, as "consultants" at earlier stages); the alternatives involve teachers in a key central role at every stage of the process. (Indeed, the "stages" may not even be identifiably distinct.)

No one would argue that there is no place for "linear" R&D organizations--but serious consideration must be given to the question: what fraction of NIE's R&D efforts should be cast in the linear form, and what fraction should be carried on by alternative organizational forms?

Appendix B

The subtle variables affecting education:

Does a child feel that extensive effort invested in a long and detailed task will necessarily fail to pay off for him, so that he therefore cannot bring himself to make the necessary sustained effort to perform the task well?

Does the child feel the kinds of culture shock reported by Rehl and Wineman? (71)

One ordinarily feels a difference between a person who shows commitment and determination toward broader goals--e.g., a determination that his students will succeed in mathematics, or learn to converse fluently in French--vs. a person who displays a routine and perfunctory performance of short-term tasks--e.g., a teacher who corrects homework assignments if school policy requires him to. Ordinary every day language has many terms to discuss this distinction: "clock-watchers," "devoted teachers," etc. How can this dimension of "devotion" or "commitment" be studied systematically? How much is already known about it?

One hears a great deal about "unresponsive institutions"--indeed, it is easy to obtain first-hand accounts for reliable observers. It is often suggested that this is the source of considerable hostility. Some studies in this area are well-known--e.g., de Charms' studies (72) of interpersonal relations, and various work reported by Rosenthal (73) --but how much more needs to be studied carefully?

One feels, intuitively, a difference between students who are trying to organize knowledge, to understand things, to go beyond any assigned tasks until they "have educated their intuitions," until they have "made the subject make sense"--as opposed to students who follow prescribed steps but do not seem to take this step of personally reorganizing knowledge. How can this distinction be studies? How much is already known about it? What promotes it, and what impedes it?

Many individuals report that certain identifiable expressive experiences are a very deep and abiding joy--e.g., perhaps listening to Bethoven quartets. How much is known about this? How can it be studied?

One feels, again intuitively, that the experience of facing an ill-defined chaos--as in dealing with unknown situations in a laboratory--and gradually achieving an organization for it by applying one's own analytical skills, is a very important experience for students to have. How can we study this sort of experience more deeply? What is "good" about it? What do people gain from it? Does this result manifest itself in pre-test, post-test measures of "change" in the person who undergoes the experience? If not, how does it manifest itself?

Those who observe schools carefully (3,5) are familiar with the "waiting-in-line" aspect of schools--even in such blatant cases as children sitting at their desks, with their hands folded, while the teacher talks with a visitor. What sort of price do we pay for treating children this way? One theory suggests that this degree of regimentation minimizes a child's tendency to throw himself fully into school work, to develop deep personal commitment to school goals. Is this theory correct? What can we learn about the effects of this sort of environment in children? (74)

Observers of schools report many incidents that seem to indicate a somewhat common tendency toward not considering children as sentient human beings--e.g., instances of talking to visitors about a child quite negatively in front of the child himself and his classmates. How can this aspect of school culture be studied systematically? How important is it? Where is the dividing line between honesty and a cruel lack of consideration for a child's feelings?

What is the effect--short-term and long-term--of being in an environment you can't shape, manipulate, or modify in any way? (26, 68)

Reports repeatedly call attention to the effect of "charismatic" teachers. What kinds of phenomena are at work here? Are some of the effects desirable, and some undesirable? How does someone become a charismatic teacher?

Experienced teachers report that many teachers are afraid of children. Is there more than one way of being "afraid of children" (intuitively there seem to be differences here)? How do teachers deal with such feelings? How do they overcome them?

Again, experienced teachers (and other professionals, such as psychoanalysts) report that it is possible to convey to students a subtle distaste for certain subjects. By what mechanisms, precisely, is this done? (73, 31)

Somewhat similarly, professionals report that the genuineness of a teacher's feelings (towards children, towards subjects, etc.) are of fundamental importance. How can one take this into account?

It is often argued that "people behave the way we expect them to behave." How much truth is there to this? (75). By what mechanisms are these expectations communicated to students?

FOOTNOTES

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